

ELECTRIC HOME OF TOMORROW

POPULAR MECHANICS



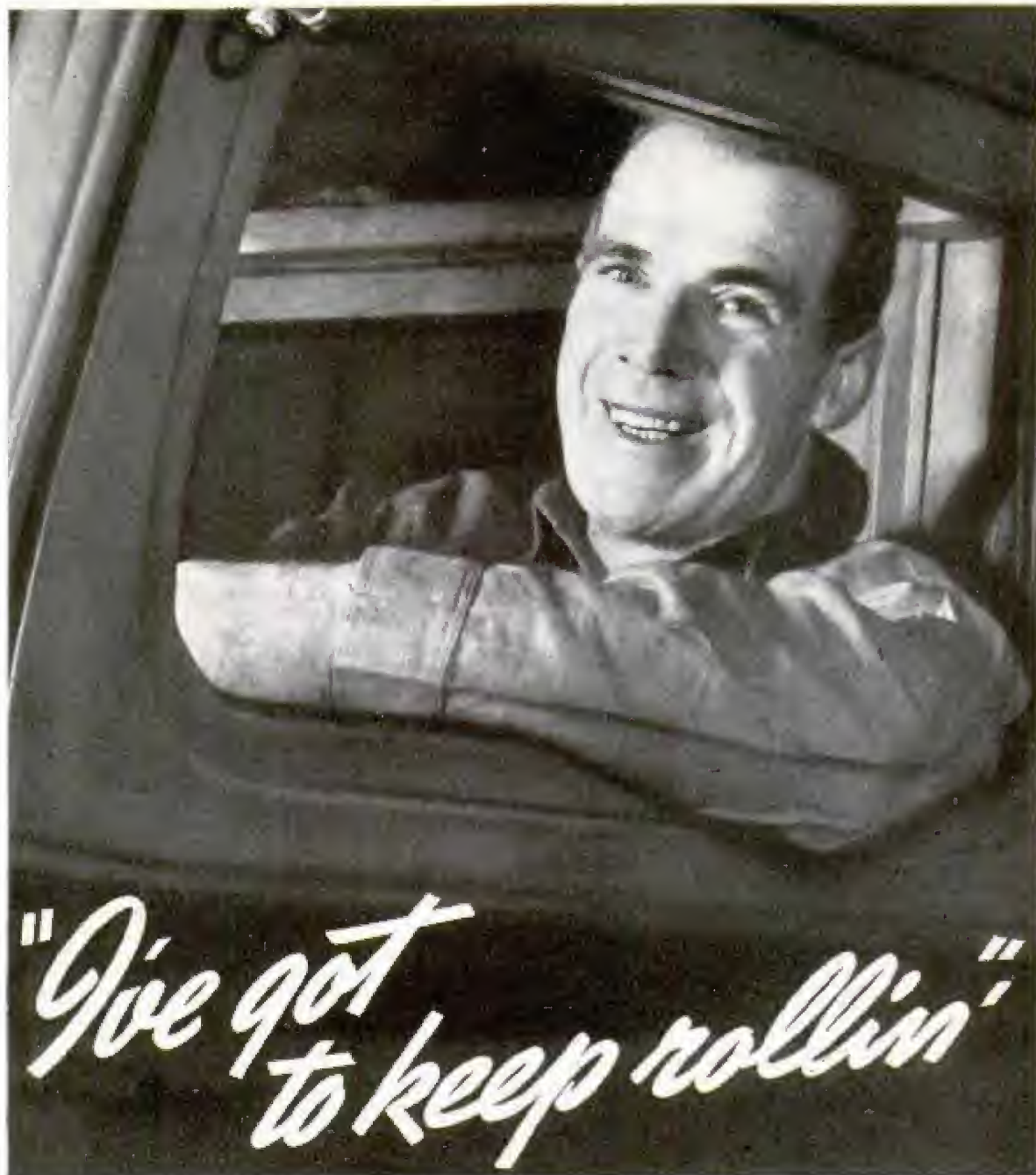
MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

AUG.
25 CENTS

SEE PAGE 214

16,000 MILES ON \$4.20



"MY JOB depends on my rolling stock. I've just got to have good, sound, dependable lubrication. That means Marfak. I've tried them all."

This truck driver is no exception. With men who have to count on lubrication—truck drivers, fire chiefs, doctors, taxi drivers, salesmen—it's Marfak Lubrication.

Here's why: Marfak is made with heavy oil like no

other lubricant and it stays on the job twice as long as ordinary grease. The 40-Point Marfak Service is given *only* by specially trained men and even they refer to Texaco "Chek-Charts." It includes many little important services so often overlooked.

There's no better lubrication service anywhere. And don't forget this: proper lubrication can greatly increase the trade-in value of your car.



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The Texas Company

THE 40-POINT LUBRICATION AT ALL TEXACO AND OTHER GOOD DEALERS

*Built to last
68% longer!*

The Willard "H-R"

Now built with

SAFETY-FILL

**STOPS
DANGEROUS
CORROSION**

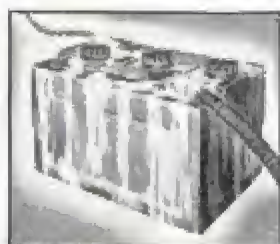
A NEW WILLARD DEVELOPMENT *that gives you*
and your car Greater
Protection!

Willard Safety-Fill Protects You from—



This

When ordinary batteries are over-filled the excess electrolyte surges out through the vents. When blown onto the wiring or exposed metal parts of the car, this acid spray causes expensive damage and corrosion.



This

If this acid remains on top of the battery it produces corroded cables and terminals... and eats away the battery cradle... resulting in substantial power losses, unexpected starting failures and added expense.



This

Service men are virtually blindfolded when filling batteries so located that the level of the solution in each cell cannot be seen. One over-filling will do untold damage. Willard's Safety-Fill can't be over-filled—it's automatic.

*Look for the
SAFETY-FILL
VENT
It never drinks too much*



HOW WILLARD SAFETY-FILL WORKS



To fill the battery, unscrew filler-cap as usual,



Place cap on SAFETY-VENT forming air lock in breather chamber.



Fill well with water. Air lock prevents solution rising above bottom of well.



Remove filler cap from the SAFETY-VENT and solution drops to correct level.

This One



1EYA-J7C-TEJX

WILLARD STORAGE BATTERY COMPANY
Cleveland • Dallas • Los Angeles • Toronto

Pennies For Wings

THE voice of a friend. Reassuring words from father, mother, son or daughter. A hurried call for aid in the night. You cannot set a price on such things as these.

Yet this is true—telephone service is cheap in this country. No other people get so much service, and such good and courteous service, at such low cost.



BELL TELEPHONE SYSTEM

The Bell System cordially invites you to visit its exhibits at the New York World's Fair and the Golden Gate International Exposition, San Francisco.



Popular Mechanics Magazine

H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher

August, 1939

Vol. 72, No. 2

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A Fortune on a Limb

EVEN the fruit industry has "talent scouts." One of them discovered in West Virginia a tree bearing yellow apples of rare flavor, crisp and juicy. He paid the farmer \$5,000, padlocked the tree in a cage with a burglar alarm, and from shoots of the tree launched a variety that made a fortune. There might be a fortune in it for you if you found a blight-resistant pear or a peach that could withstand northern winters. An article in the September issue, with eight pages of Coloroto pictures, tells how nurserymen today are teaming with Nature. Right now they're hunting a seedless, wormless apple.

Driving a Bullet on Wheels

THUNDERBOLT, the world's fastest car, has no speedometer but at top speed Capt. George Eyston could theoretically pick a howitzer shell out of the air. During a six-mile-a-minute run his body expands with heat so that he is stuck fast in the seat. These and other little-known sidelights are revealed next month in a signed story by Captain Eyston.

Next Month

TWO fast passenger trains rush headlong at each other, neither engineer aware of the other. Sixty miles away a towerman flicks a button and opens a siding switch; streamliner and express meet and pass without stopping. A freight engineer chats through the rails with the caboose uncoupled ten miles back; robots report train movements, warn of burning bridges and snowslides. "Push-button Railroading," in next month's issue, takes you behind the scenes on the railroads.

Daredevil Models

ON THE screen you saw the daring stunt man jump from a plane and land with his parachute in a motorboat. Actually the movie producer couldn't find a stunt man who would risk it. So Fred Jackman, whose hobby of building models turned into a business of making animated miniatures, built a cotton aviator and dropped him from a tiny plane on wires to a boat on an artificial pond. Read "Models That Save Lives" in the September issue.

Portrait of America

BIGGEST photographic job we know of is that engaging a fleet of fifty planes. They are taking America's picture from 14,000 feet up, and the task calls for more than 1,333,000 nine-by-nine photographs covering every inch of some 3,000,000 square miles. An article in September describes this gigantic aerial undertaking, which will require \$15,000,000 and several years to complete.

Thumbs Down ON ENGINE TROUBLES

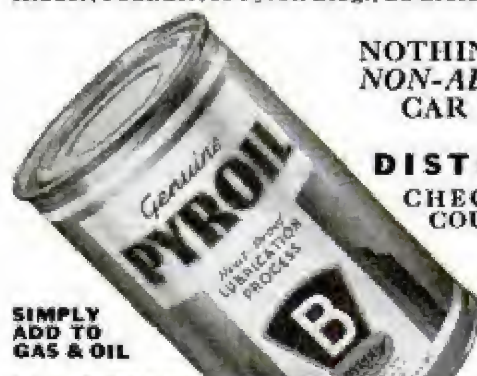
CARBON
CORROSION
ENGINE VARNISH
SLUDGE
GUM

PYROIL DEFEATS THE FIVE SERIOUS HANDICAPS TO GOOD ENGINE OPERATION

Even when your automobile is new its engine must cope with five serious handicaps, the "by products" of engine operation. They are carbon, corrosion, "engine varnish," sludge, and gum. Pyroil says "thumbs down" to these creators of serious engine trouble. For Pyroil is a safeguard that subdues their damaging attack.

Pyroil is a pure oiliness lubrication product in concentrated form. It is entirely different from the regular lubricant you use. Pour only a few ounces of it in the crank case and fuel tank of your car. This is then fed to every vital surface of your engine's interior. Pyroil's special film remains on these important metal surfaces. There it breaks up and disperses power stealing carbon. It prevents corrosion—the cause of rapid wear. It combats the formation of dangerous "engine varnish." Harmful sludge and gum are dissipated by its use.

Trouble free driving is yours when Pyroil rides along. It gives you a smoother running, longer lived automobile. Try Pyroil. It costs mere pennies per use. It often saves many dollars in offsetting otherwise needed repairs. Sold the world over at service stations, garages, and accessory stores. Ask for it! Manufactured and Guaranteed by Pyroil Company, W. V. Kidder, Founder, 58 Pyroil Bldg., La Crosse, Wisconsin, U.S.A.



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CAR BREAK IN!**

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☐ Also send details of your plan for Distributors.

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FAMOUS "YANKEE"

Handyman

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- ☐ No. 330H Accessory Pak Complete..... .75
- ☐ No. 2H Screw Driver—"It Ratchets".... .25

Name.....

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IMPORTANT NOTICE

It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. We take no responsibility as to whether the disclosures contained in our articles are covered by patents and advise readers to investigate this subject before making, using, or selling any of the products, machines, or processes described, in order to avoid possible liability for patent infringement.



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ICS

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★ Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject *before* which I have marked X: ★

TECHNICAL AND INDUSTRIAL SUBJECTS

- | | | | | |
|--|---|---|--|---|
| <input type="checkbox"/> Agriculture | <input type="checkbox"/> Air Brakes | <input type="checkbox"/> Civil Engineering | <input type="checkbox"/> Manufacture of Pulp Paper | <input type="checkbox"/> Sanitary Engineering |
| <input type="checkbox"/> Air Conditioning and Cooling | <input type="checkbox"/> Coal Mining | <input type="checkbox"/> Contracting and Building | <input type="checkbox"/> Marine Engineering | <input type="checkbox"/> Sheet Metal Work |
| <input type="checkbox"/> Architectural Drafting | <input type="checkbox"/> Cotton Manufacturing | <input type="checkbox"/> Diesel Engineering | <input type="checkbox"/> Mechanical Drafting | <input type="checkbox"/> Steam Electric Engineering |
| <input type="checkbox"/> Architecture | <input type="checkbox"/> Diesel Engineering | <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Mechanical Engineering | <input type="checkbox"/> Steam Engineering |
| <input type="checkbox"/> Auto Electric Technician | <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Fire Boilers | <input type="checkbox"/> Mine Foreman | <input type="checkbox"/> Steam Fitting |
| <input type="checkbox"/> Auto Technician | <input type="checkbox"/> Fruit Growing | <input type="checkbox"/> Heating | <input type="checkbox"/> Patternmaking | <input type="checkbox"/> Structural Drafting |
| <input type="checkbox"/> Aviation Engineering | <input type="checkbox"/> Heat Treatment of Metals | <input type="checkbox"/> Highway Engineering | <input type="checkbox"/> Pharmacy | <input type="checkbox"/> Structural Engineering |
| <input type="checkbox"/> Boilermaking | <input type="checkbox"/> House Planning | <input type="checkbox"/> Machinist | <input type="checkbox"/> Poultry Farming | <input type="checkbox"/> Surveying and Mapping |
| <input type="checkbox"/> Bridge and Building Foremanship | <input type="checkbox"/> Management of Inventions | <input type="checkbox"/> Radio | <input type="checkbox"/> Public Works Engineering | <input type="checkbox"/> Telegraph Engineering |
| <input type="checkbox"/> Bridge Engineering | | <input type="checkbox"/> R. R. Locomotives | <input type="checkbox"/> Refrigeration | <input type="checkbox"/> Telephone Work |
| <input type="checkbox"/> Building Estimating | | <input type="checkbox"/> R. R. Section Foreman | | <input type="checkbox"/> Toolmaking |
| <input type="checkbox"/> Chemistry | | <input type="checkbox"/> R. R. Signalmen | | <input type="checkbox"/> Ventilation |
| | | | | <input type="checkbox"/> Welding, Electric and Gas |
| | | | | <input type="checkbox"/> Woolen Manufacturing |

BUSINESS SUBJECTS

- | | | | | | |
|--|--|---|--|---|----------------------------------|
| <input type="checkbox"/> Accounting | <input type="checkbox"/> Advertising | <input type="checkbox"/> College Preparatory | <input type="checkbox"/> Grade School Subjects | <input type="checkbox"/> Railway Postal Clerk | <input type="checkbox"/> Signs |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Cost Accounting | <input type="checkbox"/> C. P. Accounting | <input type="checkbox"/> High School Subjects | <input type="checkbox"/> Salesmanship | <input type="checkbox"/> Spanish |
| <input type="checkbox"/> Business Correspondence | <input type="checkbox"/> First Year College Subjects | <input type="checkbox"/> Foremanship | <input type="checkbox"/> Lettering Show Cards | <input type="checkbox"/> Secretarial Work | |
| <input type="checkbox"/> Business Management | <input type="checkbox"/> French | <input type="checkbox"/> Managing Men at Work | | <input type="checkbox"/> Stenography and Typing | |
| <input type="checkbox"/> Cartooning | <input type="checkbox"/> Civil Service | | | <input type="checkbox"/> Traffic Management | |

DOMESTIC SCIENCE SUBJECTS

- | | | |
|---|---|--|
| <input type="checkbox"/> Advanced Dressmaking | <input type="checkbox"/> Home Dressmaking | <input type="checkbox"/> Tea Room and Cafeteria Management, Catering |
| <input type="checkbox"/> Foods and Cookery | <input type="checkbox"/> Professional Dressmaking and Designing | |

Name..... Age..... Address.....

City..... State..... Present Position.....

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Why Many Radio Technicians Make \$30, \$40, \$50 a Week

Radio is young—yet it's one of our large industries. More than 28,000,000 homes have one or more Radios. There are more Radios than telephones. Every year millions of Radios get out of date and are replaced. Millions more need new tubes, repairs. Over \$50,000,000 are spent every year for Radio repairs alone. Over 5,000,000 auto Radios are in use; more are being sold every day, offering more profit-making opportunities for Radio Technicians. And RADIO IS STILL YOUNG, GROWING, expanding into new fields. The few hundred \$30, \$40, \$50 a week jobs of 20 years ago have grown to thousands. Yes, Radio offers opportunities—now and for the future!

Many Make \$5, \$10, \$15 a Week Extra in Spare Time While Learning

The day you enroll, in addition to our regular Course, I start sending Extra Money Job Sheets; show you how to do Radio repair jobs. Throughout your training I send plans and directions that made good spare time money—\$200 to \$500—for hundreds, while learning.

Here's How You Get Practical Experience While Learning

I send you special Radio equipment; show you how to conduct experiments, build circuits illustrating important principles used in modern Radio receivers, broadcast stations and loud-speaker installations. This 50-50 method of training—with printed instructions and working with Radio parts and circuits—makes learning at home interesting, fascinating, practical. I ALSO GIVE YOU A MODERN, PROFESSIONAL ALL-WAVE, ALL-PURPOSE RADIO SET SERVING INSTRUMENT to help you make good money fixing Radios while learning and equip you with a professional instrument for full time jobs after graduation.

Money Back Agreement Protects You

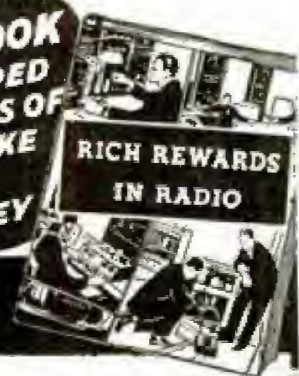
I am so sure I can train you to your satisfaction that I agree in writing to refund every penny you pay me, if you are not satisfied with my Lessons and Instruction Service when you finish. A copy of this agreement comes with my Free Book.

Find Out What Radio Offers You

Act Today. Mail the coupon now for "Rich Rewards in Radio." It's free to any fellow over 16 years old. It points out Radio's spare time and full time opportunities and those coming in Television; tells about my training in Radio and Television; shows you letters from men I trained, telling what they are doing and earning. Find out what Radio offers YOU! MAIL COUPON in an envelope, or paste on a postcard—NOW!

J. E. SMITH, President
Dept. 9HP, National Radio Institute
Washington, D. C.

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MORE
MONEY**



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Dear Mr. Smith: Without obligating me, send "Rich Rewards in Radio," which points out the spare time and full time opportunities in Radio and explains your 50-50 method of training men at home in spare time to become Radio Technicians. (Please Write Plainly.)

NAME.....AGE.....

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CITY.....STATE.....



Broadcasting Stations

Employ managers, engineers, operators, installation and maintenance men for fascinating jobs and pay well for trained men.

Set Servicing

Fixing Radio sets in spare time pays many \$5, \$10, \$15 a week extra while learning. Full time repair work pays as much as \$30, \$40, \$50 a week.



Loud Speaker Systems

Building, installing, servicing and operating public address systems is another growing field for men well trained in Radio.



HERE'S PROOF



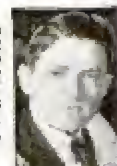
\$50 Monthly in Spare Time
"I work on Radio part time, still holding my regular job. Since enrolling seven years ago, I have averaged around \$50 every month." JOHN B. MORISSETTE, 809 Valley St., Manchester, N. H.

Makes \$50 to \$60 a Week

"I am making between \$50 and \$60 a week after all expenses are paid, and I am getting all the Radio work I can take care of. Thanks to N. R. I." H. W. SPANGLER, 120 1/2 S. Gay St., Knoxville, Tenn.



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"I have a position with the Los Angeles Civil Service, operating the Public Address System in the City Hall Council. My salary is \$170 a month." R. H. ROOD, City Hall, Los Angeles, Calif.



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Grade School Graduate



After I had completed the College Preparatory course with the American School I was admitted to Indiana University where I made a general average of 90. I was told by my professors that I had the "study habit" and was better able to carry college work than many graduates of resident high schools. The courses given by the American School were so thorough and complete that my foundation for advanced work was adequate and strong enough to stand the tests. — DELMORE LIGGETT, Rising Sun, Indiana.

The man with only grade school education starts at \$400 a year, averages only

\$1,265 a year over a period of 40 working years. Today no ambitious man need be chained

down to low pay by grade school education. In your own home you can get expert help and complete your high school course or prepare for drafting, Diesel, air conditioning, etc., and get ready to earn more money.*

High School Graduate



I graduated from high school in June, 1936, and in October, 1937, enrolled in your Engineering Course just a little over a year ago; and I am writing you today telling you of the wonderful things which have happened to me since that day when I enrolled. I have studied hard and consistently and according to your instructors have earned good grades and have progressed rapidly. This rapid progress has been made possible by the methods "American School" uses and the splendid manner in which your instructors handle any special inquiries or problems which may confront the student.

Very recently I did the major part of the Designing, Drawing and Detailing of a device which has been patented by one of the world's leading automotive truck manufacturers. This device is being used now by the Motor Truck Corporation and they have made the statement that it saves them \$13 on every unit they produce. I will not be 21 years of age until next Spring and expect by that time to have completed my course and have my "American" diploma which I will be mighty proud of. — EDWARD H. MCCLELLAND, Cleveland, Ohio.

High School graduate starts at \$900 a year, averages \$2,112 over a 40-year period. This means that *High School education to average persons is an actual cash earning of \$847 above earning of the average grade school graduate.* A High School graduate

not only has bigger jobs open to him, but he can go on to college, prepare for teaching or other professions, or for leadership in business or industry. High School education definitely increases your opportunities for advancement and your earning ability!*

College or Vocational Training



From a practical standpoint I can truthfully say that my study of the course accomplished for me all I ever hoped it could and even more. As evidence of this, I submit the fact that at 30, I am now employed as auditor and accountant in a position of trust at compensation more than double what I was receiving at the time of my enrollment. — L. V. PEART, Ogden, Utah.

The man with college education or some other form of specialized training starts at \$1,400 a year, is earning \$5,000 at the age

of 49—or an average of \$3,425 a year. He is a leader in his community, has a good car,

and a comfortable home. You can get ready for opportunities open to Architect, Business Manager, Mechanical Engineer, Professional Accountant, etc., through expert methods of preparation available in your own home, and get the knowledge that will open the way to the higher paid jobs!*

*Figures from Government report.

Mail the Coupon for a Free Lesson

Applicants—

Definite Promotion Step

Step Up to a Better Job by Stepping Up Your Fitness for It

You think in words but you cannot think, write or speak in words you do not know.

How about your job? What you think and do is limited to things you know. Every new task or operation—every new job—is a new lesson to be learned, and your grading on that lesson definitely measures your efficiency. You should make it your first order of business to learn everything you possibly can about your present job. Do not be satisfied with just getting by. Become the best informed person on that kind of work in your office or plant.

Next consider the job ahead. Study up on the principles of the new work. Learn all you can about it so when there is an opening and you are offered the chance to step up you will be prepared to make good. All of us are on trial at all times.

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There are jobs and opportunities today in such active fields as Air Conditioning, Diesel, Drafting, Accounting, Merchandising, etc. *These jobs—these opportunities—are open only to trained men.* That's why thousands of ambitious men are taking American School's courses—are spending a few hours a week getting ready to earn more money.

American School graduates hold important positions as architects, engineers, accountants, superintendents,

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Without obligation send for a beginning lesson. Spend an evening reading it and you will be surprised at how much you can learn in only one hour. You will find out how other fellows are making good—earning promotion.

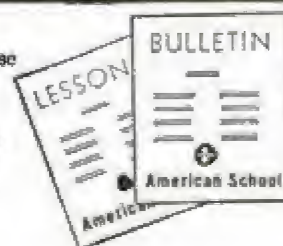


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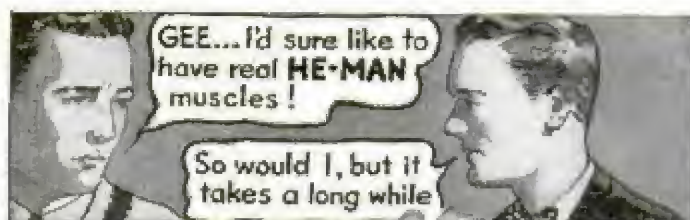
I have checked the line of work in which I would like a good job. Please send me without expense or obligation on my part a copy of your Bulletin and an early lesson in the field I have selected.

- | | | |
|--|---|---|
| <input type="checkbox"/> Air Conditioning | <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Law |
| <input type="checkbox"/> Architecture | <input type="checkbox"/> Diesel Engineering | <input type="checkbox"/> Liberal Arts (College) |
| <input type="checkbox"/> Automotive Engineering | <input type="checkbox"/> Drafting and Designing | <input type="checkbox"/> Mechanical Engineering |
| <input type="checkbox"/> Automobile Repairing | <input type="checkbox"/> Electric Refrigeration | <input type="checkbox"/> Merchandising |
| <input type="checkbox"/> Bookkeeping and Cost Accounting | <input type="checkbox"/> Heating, Ventilating, Plumbing | <input type="checkbox"/> Private Secretary |
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Professional Accounting | <input type="checkbox"/> Radio and Television |
| <input type="checkbox"/> Civil Engineering | <input type="checkbox"/> Incl. C. P. A. Coaching | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Aviation | <input type="checkbox"/> High School | <input type="checkbox"/> Shop Practice |
| <input type="checkbox"/> Contracting, Building | <input type="checkbox"/> Highway Engineering | <input type="checkbox"/> Steam Engineering |
| | | <input type="checkbox"/> Shop Management |



Name..... Age..... Occupation.....

Street..... City..... State.....



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DIESEL

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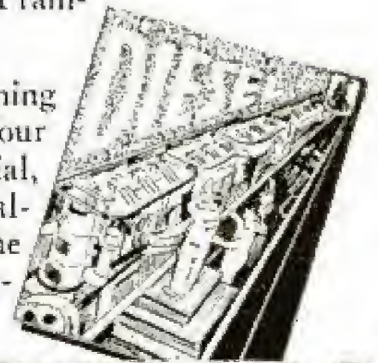
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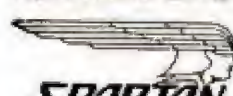
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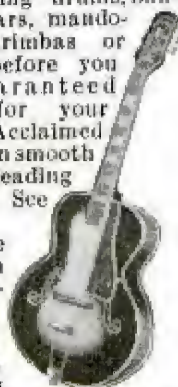
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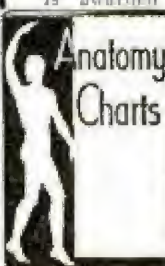
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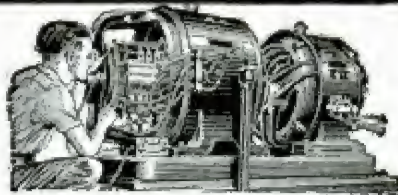
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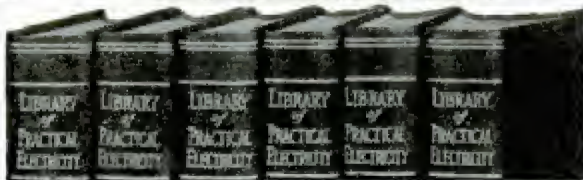
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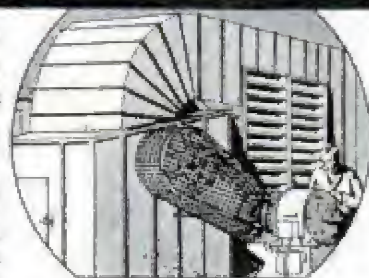
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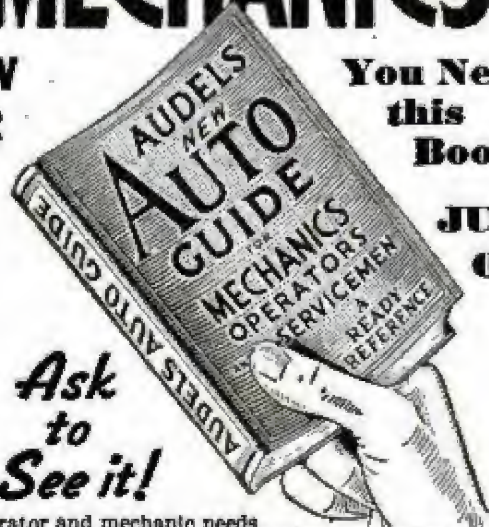
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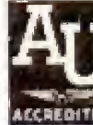
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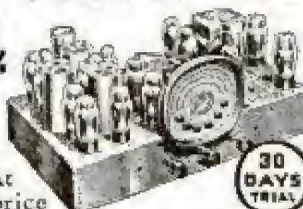
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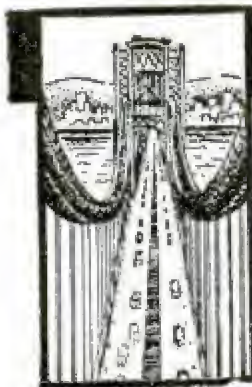
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HAVE You a camera? Send ten cents for recent number of our big magazine, showing how to make better pictures and earn money. American Photography, 116 Camera House, Boston, 17, Mass.

IF You go to Mexico ask first for prices and pamphlets of finest German quality miniature and other cameras, binoculars, movie cameras and projectors. Foto Mantel Sucr. R. Rudiger V. Carranza II, P. O. Box 1459, Mexico City-105. Branch store: Tijuana, Baja California. Branch store: Tijuana, Lower California. Hotel Comercial. Branch store: Monterrey, N. L., Morelos Oriente No. 557.

MOTION PICTURES AND SOUND EQUIPMENT

8MM. CHROMOFILM! Guaranteed finest quality reversal! Fine grain orthochromatic! Weston 8! Free processing included! Two 30 ft. spools for Univex \$1.00! Two 25 ft. "Double 8" spools \$1.90! Bulk film specials! 100 ft. "Double 8" \$1.50! 130 ft. "Single" \$1.00. All postpaid! Order now! Chromo Films, 156-Q Springfield, Rutherford, N. J.

SCREENS For better home movies. Free circular. Albert R. Clayton, 2923 W. Girard Avenue, Philadelphia, Penna.

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COMPLETE 16mm. Film rental library. Attractions: "Covered Wagon," "Behind the Front," "Pony Express." Send postage for free catalog. National Cinema, 3 West 29th, New York.

LATE Talkie programs rented, \$15.00 week; \$7.50 two nights. Simpson, 1275 South Broadway, Dayton, Ohio.

50-16mm. SOUND Projectors. Cheap. Roshon, State Theatre, Pittsburgh, Penna.

UNIVEX 8mm. Bargain lists free. Paragon, Box 453, Meriden, Conn.

8MM-16MM. Bargains. Free catalog. Movie Shop, 838 Broadway, Bayonne, N. J.

DOUBLE 8MM. film. 2 rolls \$1.75. Including processing. Super Home Movies, 4710 North 30th, Milwaukee, Wisconsin.

NEW Plan insures saving money on your film bills. Buy equipment at cost prices. Write: Pictures, Bridgeport, Conn.

COMPLETE 8-16MM. film rental. Library "attractions": "Hunchback of Notre Dame," "4th Commandment," "America Goes Over," "Westbound Limited," "Tarzan of the Apes." Many others. Films rented everywhere. Equipment; bargains. Trades accepted. Free catalogue (with sample film 10c). Garden Exchange, 317 West 50th, New York.

BARGAIN Sale—Send \$5.00 for one reel 16mm. silent film. Church & School Films, Box 524, Cincinnati.

HYPER Speed 16mm. pan. \$2.50 hundred feet. Nonhalation. Weston 50, no processing. Minimum order 400 feet. Innes Laboratory, Wood-Ridge, N. J.

ROYAL Home movies. Also nationally advertised camera film. 8mm.-16mm. reduced 25%. Free list. Royal Home Movies, 42A Melrose St., Boston, Mass.

SAMPLE Film, art. others, 10c. Lists free. Goodwill Company, Jackson, Tenn.

LOOK! "The world's greatest of all Passion Plays." 35mm. and 16mm. Sound or silent, rent or purchase. Hemenway Film Co., F 37 Church St., Boston, Mass.

16MM. VELOTEX. Perfect outdoor film. 100 ft. rolls \$1.95 including free processing. Sample free. Velotex Laboratories, 600-D, Gary, Indiana.

MAIL Dollar bill for 100 ft. 35mm. talking film. Full length features \$15. Mertz, Virginia, Illinois.

LARGE List of 8mm.-16mm. film bargains, cartoons, comedies, arts. Used and new equipment. Abbe Films, 1265 Broadway, New York City.

FREE 8mm. And 16mm. discount bulletin. James A. Peters, Dept. PM, 458 Turner Street, Allentown, Pennsylvania.

GENERA Film in bulk for all movie cameras. 90 feet for Univex, \$1.10 (spools, 3 for 60 cents); 100 feet double 8mm., \$1.75; 16mm., \$1.35. Sample for stamp. Process with our powders. Fromaders, Davenport, Iowa.

100 FT. 16mm. Outdoor film \$1.95. 25 ft. double 8mm., \$1.35, free processing. Free 8mm., 16mm. lists. Home Movies, Box 216, Easton, Penna.

GUARANTEED 8MM. 24-hour reversal processing. Double 8mm., 45c. Single, 25c. Univex 15c. Eso-S, 3945 Central, Kansas City, Missouri.

MOVIE Film. Develop yourself. Univex, Eastman, etc. Chemical samples 15c. Raw film wholesale. Lake Camera Exchange, Gary, Ind.

HERE'S News from Bass! Our 64-page Cine Bargaingram is ready! Free for the asking! 8 mm., 16 mm., and 35 mm. silent and sound equipment. Popeye, Betty Boop, and other films. Accessories to gladden the heart of amateur or professional. A few used bargains: Univex 8 camera, F-5.6 lens, each \$5.75. Univex, motor drive, 8 mm. projector, \$12.50. Bell & Howell model 57, 16 mm. projector, 200 watt, and case, \$32.50. New RCA 16 mm. sound on film camera, Newsreel model, \$250.00. Write today. The book will be mailed at once. Bass Camera Company, Dept. A, 179 West Madison St., Chicago, Illinois.

15% TO 25% Discount on still or movie cameras. Free circular. Paramount Co., 327 E. 92nd St., New York City.

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RADIO Engineering, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Ames St., Valparaiso, Ind.

SEND For free giant money saving radio and phonograph record catalogue. United Radio Company, 1090-M, Newark, N. J.

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NEW Songs wanted; suitable for publication. Details for stamp. Metropolitan Music, 126 Lexington Ave., New York.

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SONGS, Song poems, bought, published. Free information. Best offer. Metro Melody Music Publishers, 1204 Sutter, San Francisco.

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JOIN Our Record Club. Send for your copy of this big 500 page record catalog and encyclopedia. Contains lists of thousands of famous records and musical data on pronunciations and dates of composers; 25c plus 10c for mailing. (stamps or coin). It also enrolls you in our Record Club. We carry a large selection of records from 10c up. Write today. Modell's, Dept. 305, 58 Cortlandt St., New York City.

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SONG Poems wanted. Free examination. Send poems to McNeil, Bachelor of Music, 4153-PM S. Van Ness, Los Angeles, Calif.

SONGS Or lyrics wanted for "Musical Night Court" radio show and publication. Write to Judge Spencer, 145 West 45th, New York, Studio PM. Enclose stamped, self-addressed envelope for full particulars. Do not send songs, lyrics. Print name.

SONG Writers—Share royalty plan. Hollywood Harmonizers, 6612-P Sunset, Hollywood, Calif.

SONGWRITERS—Agents. new sales plan. National Music-D, 532 Sixteenth, Oakland, Calif.

SONGS—Arranged, revised by arranger "Linger Longer," "Gypsy Tearoom," others. Send for details. Harold Potter, 1619 Broadway (P), New York.

SIMPLIFIED Swing courses! Accordion, saxophone, clarinet, trumpet. Write Swingmaster, 1259-N Bender, East Cleveland, Ohio.

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SONGWRITERS: Send your poem today for immediate consideration. Richard Brothers, 24 Woods Building, Chicago.

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MAIL Business Journal. Practical opportunities. Copy 10c. Research Sales, Pomona, Calif.

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CAPITAL—How and where obtained for personal or business needs. Capital Service, Arlington, Va.

PEAR Candy bars. Money-maker. Splendid sales. Home-made confections. Send \$1.00 for sample box. Home Confections, Kelseyville, California.

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REAL Estate foundation all wealth. Start own office. Learn how through home study. Write Morrison School Real Estate, 100 North LaSalle, Department 9, Chicago.

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\$25 A WEEK Spare time. Free circular. Hammond, 120 W. Susquehanna, Philadelphia, Penna.

WANT Extra money? Mail order business is your opportunity. New plan complete with ads one dime. Bert Newberry, Citronelle, Alabama.

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BUILD Neon signs. A business for yourself. McMaster Sign Co., 730 State St., Bellingham, Washington.

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POPCORN Machines, all types. Carmel-corn equipment. Northside Mfg. 1925-10th, Des Moines, Iowa.

SUCCESSFUL Business easily started! Big profits! Formula catalog free. B. Kin-ford, Wayne, Penna.

IF Out of employment or wishful of own business, start advertising plan. Soon may earn good money. Laugh at employers. Hardly any capital. Circular free. Janet Specialty, Box 253, Taunton, Mass.

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LIQUID Marble—anyone can make! Colorful, glazed! Molded, brushed, sprayed. Rubberlastic moulds. Composition flooring. Big money in these! Particulars free. Marbleizing Service, Edwardsville, Ill.

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MAN In each town to plate auto parts, reflectors, bicycles, fixtures, mirrors, by late method. Simple plan of manufacturing at home starts you in good paying business. Free particulars and proofs. Gun-metal Co., Ave. H, Decatur, Ill.

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BEAT Unemployment, make 5 cent wholesale sandwiches your home daily, 15 years successful experience furnished. 3031 West Jefferson, Dallas, Texas.

MONEY In butterflies, moths. See Sinclair Display Advertisement on page 16A.

SONGS, Song poems, bought, published. Free information. Best offer. Metro Melody Music Publishers, 1204 Sutter, San Francisco.

START Your own business manufacturing from my formulas. Easily made, large profits. Stewart, Box 1962, Hartford, Conn.

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PROFITS, Day-night. No selling. Operate "Silver King" vendors \$3.25 up. Free instructions. Automatic, 2427 Fullerton, Chicago.

MAKE Household product of 100 uses. Sell by mail or agents, spare time. Information free. Ribot, 620 East 62nd, Chicago.

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EXTRAORDINARY Success always assured using Miller's Certified Formulas! (Based on analysis of America's exceedingly popular products.) Stamp brings latest Formula Messenger. Miller, Manufacturer's Chemist, Tampa, Florida.

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LABORATORY Spectroscope for chemical analysis \$2.50. Kutting Sons, Campbell, California.

FREE Chemistry catalog. Supplies at 5c! Equip complete laboratory. Send 3c for postage. Kemkit Scientific Corp., 397F Bridge St., Brooklyn, N. Y.

CHEMICALS. Laboratory, glassware, apparatus. Send 3c for catalog CP1. Biological Supply Company, 1176 Mt. Hope Avenue, Rochester, N. Y.

HELP WANTED

EXCLUSIVE Distributorships available! World's finest cosmetics, flavors, medicines, polishes, waxes, cleaners, soaps, insecticides, deodorants, etc. Unique! Sensational demonstrators! Samples, proposition, \$1.00. Ultra-Modern Laboratory, 1305 Walnut, Cincinnati.

\$1.50 PROFIT. Sell Kneecap Drive, an alternate auto throttle control. Good item, sells well, money back guarantee. Comfort Drive, P.O. Box 256, Pasadena, Calif.

RUN A big paying coffee and grocery agency. Immediate earnings up to \$45. Additional cash bonus amounting to nearly \$10.00 per week. No experience needed; easy to start; no money risk. Let me mail full particulars free. Mills, 6042 Monmouth, Cincinnati, Ohio.

M. M. Earned \$267, three weeks, raising mushrooms in cellar! Exceptional, but your cellar, shed perhaps suitable. We buy crops. Book free. United, 3848 Lincoln Ave., Dept. 63, Chicago.

SALARIED Positions—\$2500 yearly and up. Let us find one for you. Write for valuable information. Executive's Promotion Service, (16) Washington, D. C.

AGENTS WANTED

SENSATIONAL Christmas card money-maker! 21-card assortment with sender's signature in gold sells \$1. You make 100%. Also 50 name-imprinted Christmas cards \$1. Other popular assortments. Get samples. Friendship, 408 Adams, Elmira, N. Y.

RESURRECTION Plant, unique novelty, miracle of nature. Costs below 2c, sells for 25c. C. E. Locke, 10 Rio St., Mesilla, New Mexico.

CHRISTMAS Cards. Earn \$2 an hour. Take orders galore from friends. 50 exquisite folders with name at \$1. Free album 32 designs. Fastest selling 21 folder box in America. Costs 50c. Sells \$1. Request samples. Sunshine Art, Dept. E, 154 Nassau, New York City.

BUSINESS Proposition resilvering mirrors, autographs, reflectors, making chipped glass signs. Write Sprinkle, Plater, 128, Marion, Indiana.

MAGIC Home-pressing invention gives expert steam-press to all silk or wool garments. Puts knife-edge crease in trousers and pleats. "Pres-Kloth" sweeping country. Sells 50c with big profit. Sample postpaid 25c. Parris Dunn, Dept. P-22, Clarinda, Iowa.

EXTRA Money easy. Show smart personal Christmas cards with name. 50 for \$1. up. Outstanding values. Also 21-card assortment. \$1; others. Big profits. Samples free. Wetmore & Sugden, 749 Monroe, Dept. 78, Rochester, N. Y.

MAN Wanted to supply Rawleigh's Household Products to consumers. We train and help you. Good profits for hustlers. No experience necessary. Pleasant, profitable, dignified work. Sales way up this year. Write today. Rawleigh's, Dept. H-53-PPM, Freeport, Ill.

YOUR Hose free with outfit. Make up to \$32.50 in a week taking orders for amazing new hose. Replacement guaranteed against holes, snags, runs. Rush name, hose size. Wilknit. Desk H-37, Greenfield, Ohio.

CHRISTMAS Card bargains. Sell 50 personal Christmas cards for \$1. All beautiful folders with customer's name inscribed. Liberal profit. Free samples. Also marvelous value \$1.00 box assortments. General Card, 400 S. Peoria St., Dept. P-19, Chicago.

I'LL Give you groceries at wholesale besides splendid opportunity to make up to \$45.00 in a week. Brand-new Ford sedan given as bonus. Details free. Mills, 6042 Monmouth, Cincinnati, Ohio.

BEAUTIFUL Bird pictures handmade with genuine feathers. Sell on sight! Large profits! Free particulars. Samples 10c stamps. Marquez-PK, Apartado 1176, Mexico City.

500% PROFIT With new perfected (1939) quick-action, no flint, automatic gas lighter. Retail 25c. Sample 10c. New Method Co., Box PMG-80, Bradford, Penna.

SELL Famous Glas-Glo. Sample 3c. Glas-Glo, Phelps, N. Y.

CHRISTMAS Card money-makers! Sensational \$1 assortment 21 Christmas folders starts you making money now—50c profit each box. Other fast-selling assortments; personal Christmas cards, 50 for \$1. Samples free. Schwer, Dept. L-4, Westfield, Mass.

AGENTS. New lawn mower sharpener. Sharpens two minutes. Sells fast. Free trial offer, samples, \$1.85. Manufacturer, 5242 Kirkwood Place, Seattle, Wash.

MYSTERIOUS Disc heats water instantly without coal, gas or oil. Pays up to 233% profit. New principle. No risk sample offer. Write Lux Co., Dept. H-5, Elkhart, Indiana.

BARGAINS—100 Blades 25c; electric razor 70c; candid type camera 75c; soap, gross cakes \$1.44; blankets, each \$1.20. Free catalog. World's lowest priced wholesalers. Mills Sales, 901 Broadway, New York.

AGENTS Buying guide, wholesale factory prices. Buyer's club membership. "Profitable pointers." R. Buyer's Club, Ellwood City, Penna.

SENSATIONAL Glass cleaner, brightener. Garages, gasatoriums, housewives buy. Trial pint 35c. Clean-O, 1323 Elm, Denver, Colorado.

AGENTS. Merchants specialty. Sample dime. Refunded. Lamont Company, Beacon, New York.

AT Home—your own manufacturing business; making popular \$1.00 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. Y-842, Cincinnati, Ohio.

SELL Clean-E-Ze polishing cloth. Sample free. Wayne Products, Pleasantville, N. J.

LOCAL Agents wanted to earn bonus suits and demonstrate to friends. Up to \$12 in a day easy. Experience unnecessary. Valuable demonstrating equipment, actual samples absolutely free. H. J. Graves, 1350 Harrison, Dept. W-817, Chicago.

YOUR Own business, dignified. No selling. Few weeks of your time insures you steady income for years. We do the work. Small investment. Printograph Co., 563 Warren St., Roxbury, Mass.

100% PROFIT In new perfected (1939) quick-action self-starting cigar lighter. No flint or friction. No wind can blow it out. Retail 25c. Costs you \$1.75 dozen. Sample and can fluid 25c. New Method Co., Box PM-81, Bradford, Penna.

DON'T Be a job hunter. Send for free copy Carey's Cash Colner. Carey, Converse, Indiana.

AGENTS: Young and old to sell new streamlined fibre brooms; they sell at sight. Write Burtz Fibre Broom Co., Columbia, Penna.

AGENTS—Men-women, sell Re-Sto-R stove polishing oil. Attractive package. 100 per cent profit. Repeats, no competition. Lusterine Mfg. Co., Bridgeport, Conn.

THREE-WAY Moneymaker. Local or mail order. Write Pines, E-583 Monroe, Brooklyn, N. Y.

NEW Invention—Gas station signal. Cheaper, better, no installation. Five year guarantee, 100% profit. Knipp, Jefferson Building, Los Angeles, California.

AGENTS Are making easy money selling new steel shoulder automobile broom. Every housewife and motorist needs one. Send 50c for sample and sales literature. The Brester Co., Scott and Mohawk Ave., Fond du Lac, Wis.

MONEY In butterflies, moths. See Sinclair Display Advertisement on page 16A.

CHRISTMAS Cards. Sell 50 assorted folders name imprinted \$1.00—cost you 50c. Samples free. Dunbar, New Brunswick, N. J.

AMAZING Device cuts own hair. \$2.40 dozen takes in \$6.00. Hub Mfg., 715 South Dearborn, Chicago.

SPECIAL Arranged hit songs, sell school children, stores, etc. Big repeats. Trial 5 for 25c. K. B. Music Co., Inc., So. Orange, N. J.

EARN Extra dollars. Start own business. Make, sell new product by mail, spare time. Details free. Young, 3148 North, Chicago.

BIG Money selling guaranteed reconditioned Elgin, Waltham, Hamilton watches, \$3.75 up. No investment. Free catalog. Grossman Jewelry, 4666-L State, Chicago.

PROFIT With new products. Make, sell, repeat. Analysis. Research. Guaranteed formulas. Biggest catalog free. Nominal prices. Gibson Laboratory, Chemists, BD-1142 Sunnyside, Chicago.

EX-O-LENE Anti-knock power compound. More mileage, power, speed, pep guaranteed. Thermo Exolene, Peoria, Ill.

BE Independent! Big repeat business in home town. Send 10c (coin). H. J. S. Circulation Company, Chester, Illinois.

500% PROFIT! Transfer sign letters for windows, offices, trucks, signs. Colors: gold, silver, red, many combinations. Auto monograms. Easily applied. Neonite, Akron, Ohio.

AGENTS: Smash go prices! Santos coffee 12c lb. 4-oz. vanilla 8½c. Razor blades 10 for 8½c. 100 sticks chewing gum 12c. Christmas cards, 21 in box, 14c. 150 other bargains. Premiums. Experience unnecessary. Carnation Company, PO, St. Louis, Mo.

WHOLESALE Catalog. Razor blades, needles, soaps. Bulger, 114 Rindge, Cambridge, Mass.

OPPORTUNITY To handle Winco household products. Attractive offer on reasonably priced daily used products. Write Winchester Compounds, Winchester, New Hampshire.

SAVES Gas, oil, repairs. Every motorist prospect. Sample 25c. E. Corcoran, Box 2559, St. Johns, Portland, Ore.

AGENTS Make big profits on food products, bargain deals. Low wholesale prices. Rush name for trial outfit offer. Ho-Ro-Co, 2810-S Dodier, St. Louis, Mo.

SELL Fan razor blades. Sample free. National, 430 Central, Cincinnati.

AGENTS—To mail our literature. Good profits. Home business. Maywood, 1105-1107 Broadway, New York.

SUCCEED With your products. Make-sell. Formulas. Accurate analyses. Catalog free. B. Thaxly Company, Washington, D. C.

ATLAS Window sign letters. Large sizes—penny each. Get beautiful samples. Atlas, 7941 Halsted, Chicago.

ENGRAVED Name plates, numbers, signs, etc., easily sold, profits large. Brett Bros., Winthrop, Mass.

300% PROFIT Selling gold leaf letters for store windows; high grade letters 14c each. Free samples. Metallic Co., 438-B North Clark, Chicago.

BIG Money applying initials on automobiles. Easiest thing today. Free samples. Also, sideline salesmen for short order decalcomania name plates. "Ralco," 1305 Washington, Boston, Mass.

AGENTS—Opportunity make money; book containing 107 successful business plans; home-office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

STARTLING Invention—Pocket adding machine. Nationally advertised \$2.50. Whirlwind seller. Big profits. Baby Calculator Co., Box 1118, Chicago.

REVOLUTIONARY Window cleaning tool. Good Housekeeping approval. Only ten \$2.25 sales daily to housewives, factories, schools, stores will make you \$350.00 monthly. Carter Products Corp., 900 Front Ave., Cleveland, Ohio.

BIG Money applying initials on automobiles. Write for particulars and free samples. American Letter Company, Dept. 40, Dunellen, New Jersey.

FREE Sample—Amazing cleaner; sells homes, taverns, everywhere. Big profit—fast repeater. Betco, 5007 Irving Park, Chicago.

MANUFACTURE Specialties, hire agents yourself. Big money. Free literature. Gilbert Supply, 1107-F Broadway, New York.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

YOU Get \$5.00 cash for distributing 100 samples. 100% profits from sales and repeat orders. 10c brings full details. Earlrich and Co., Cedarville, Ohio.

GET This. \$1.00 makes you \$25.00. Nothing else to buy. Pma. Kohn, 506 W. 45th, Chicago.

FOR An extremely profitable lifetime business, operate a collection-credit agency. Free folder. Klein Associates, Taylor, Texas.

SELL To colored. New hair dressing. Bleach cream. Sells fast. Get free samples. Valmor, 2241 KV Indiana Ave., Chicago.

CHRISTMAS Cards, birthdays, etc. Earn big extra money, bonuses, (up to 100% profit). Experience unnecessary. Easiest-selling dollar lines. Free samples, descriptive folder. Pen-Brush Studios, 154 Nassau Street, New York, N. Y.

AGENTS! For big money, see ad on page 138A. Quick Trimmer Sales Co.

DO You want agents for your proposition? Your ad in this space will place your message before hundreds of men seeking fast-selling products. My folder "How to Secure Agents" is filled with proof. I'll gladly send you a copy free. P. W. Johnson, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

HIGH-GRADE SALESMEN

SENSATIONAL Carded product: Selling all stores. Fast repeater. No competition. Exclusive territory. Samples 25c. Garding Company, 17 Burton Ave., Hopewell, N. J.

\$4.50 PROFIT In one day by Hewett; \$11.00 in seven weeks by Barber; over \$200 per week all summer by Felton; all selling our special tool set to garages; exclusive territory. Write Mesco, Beaver City, Neb.

ADVERTISING Book matches offer liberal, steady earnings—full, spare time. Experience unnecessary. Direct factory service; low prices for peak quality. Help get orders; quick repeats. All business firms are prospects. Free outfit. American Match & Printing Co., 4822 South Trumbull Ave., Dept. 68, Chicago.

CALL On friends with sensational new personal Christmas cards and stationery. Names imprinted. Also big-value 21 card assortment at \$1.00. Profit 50c. Experience unnecessary. Samples free. Wallace Brown, 225 Fifth Ave., Dept. E-34, New York.

BIG Cash profits—tremendous demand. Millions business men, offices, restaurants, factories, live. Flash-A-Call prospects. "Loud speaker 2 way"—10 station Inter-Communicator. Saves money, miles of walking, valuable time. No service or installation problems. Operates like radios—one electric socket connection. New low price \$17.50 opens unlimited sales possibilities. Free demonstrator offer. Write quick! Inter-Communication System of America, Dept. 302, 2440 Lincoln Ave., Chicago.

POCKET Cigarette maker. Nickel plated. Strong ribbon. \$1 value. Send 25c for sample at hundred price. PataPad Co., Nashville, Tenn.

ADVERTISING Book matches—Sell union label book matches. Fastest selling line in America. Large sales producing kit, sample matches, complete cut catalog, eight color combinations make selling easy. Commission in advance. Superior Match Co., 7530 Greenwood, Dept. M-8, Chicago.

SELL Printing at cut prices. 2,000 business cards \$1.50; 1,000 envelopes or stationery, etc. \$1.75; 25 printed sales books \$1.50; 1,000 process embossed cards \$1.50; 2,000 two-color labels, free holder \$1.50; 2,500 printed handbills \$1.75; 500 book matches \$1.50. One-third comm. Free outfit. Bargain Ptg. Co., 189-F W. Madison, Chicago.

BIG Commissions—selling to stores celluloid pricing tickets, metal shelf moulding. To restaurants, menu covers, signs. P. Pricing Press, 124 White St., New York.

ADVANCE Comm. up to \$2 per pair. Shoes direct to consumer. No investment. Everything furnished. Experience unnecessary. Brown-Goodie, 178 Lincoln, Boston.

AMAZING New auto safety device revolutionizes summer driving. Every service station, garage a prospect. Vernon Co., Newton, Iowa.

MEDICINE Distributors with live crews make big money selling Axon Authorized Preparations. Steady repeaters. Exclusive territory. Authorized Brands, Atlanta, Georgia.

DID You make \$50 last week? Does your job offer you real future? If not, why not start a wholesale business of your own? Start with little as \$2.50. Handle line 200 nationally advertised 50-10c products. Show merchants new plan for increasing sales and profits. Handle everything from your home at start. Chance to operate one of our Silver Fleet service trucks. Facts free. World's Products Co., Dept. 10-H, Spencer, Ind.

SELL Business cards \$1.50 thousand. Business stationery, book matches, advertising gummed tape, paper towels, advertising pencils, salesbooks, rubber stamps, pricing sets, advertising specialties. 35% commission daily. Money making specials. Free sales portfolio. Willens, 2130 Gladys, Dept. JC, Chicago.

OPENINGS! Call on all dealers with new trade-stimulator plans. It's "hot." \$3 commission on each \$5 sale. Big repeat commissions. No investment. Sales kit free. Universal, 6227 Broadway, Dept. C58, Chicago.

SELL America's largest line business necessities. Book matches, gummed labels, political items, restaurant supplies, salesbooks, shipping supplies, office supplies, advertising specialties, business stimulators, business stationery and forms. Hundreds fast sellers. New low prices. Commissions advanced daily. Experience unnecessary. Complete outfit free. Northwestern, AZ-625 Jackson, Chicago.

DISTRIBUTOR—New, amazing 10c drug item, sells taverns, grocery, drug, liquor, tobacco stores like wildfire; beautiful display; double moneyback guarantee; radio advertising. Qualifications: Clean record, able to handle salesman, carry reasonable warehouse stock. Last chance; act immediately. Quix Company, Inc., Los Angeles.

MAKE More money with Red Comet Automatic Fire Extinguishers. Low price. Proved seven years. Splendid sales outfit free. Some good territory open. Exclusive. Write quick. 704 Red Comet Bldg., Littleton, Colorado.

BLADES. Finest quality. Factory prices, postpaid. Ace Blades, Buffalo, N. Y.

SPARKLING Glo-Brite signs sell fast to stores, restaurants, taverns. Lasting gold finish. Religious mottoes. J. A. Baxter, Cambridge, Ohio.

NEW Specialty—Sells every business and professional man. Four \$15 sales daily pay \$250 weekly. Farrell cleared over \$1,000.00 monthly. Write, F. E. Armstrong, President, Dept. PM, Mobile, Ala.

EXCELLENT Opportunity selling our complete line of brushes, largest commissions. Write for sales plan. Wire Grip Sanitary Brush Company, 2300 5th Ave., New York.

NEW Miraculous foot oil "Pedoxylin." sells like wildfire druggists, jobbers. "Bud" Kevin, walking New York to San Francisco fairs, using it, says "results amazing." Biggest moneymaking opportunity you ever had. Protected territory. Attractive counter display gets big business. Write immediately. Meta Lee Laboratories, Inc., 1218 Garland Building, Chicago.

EDUCATIONAL AND INSTRUCTION

LEARN Watchmaking. Complete instructions \$3.50. Work models 50c. Catalog wholesale tool, material, watches 5c. Stewart's, 721 Olive, St. Louis, Mo.

MASTER Teacher offers individualized homestudy. Basic school subjects. Write Drawer 1590, St. Augustine, Florida.

MEN—Women. \$105-\$175 month. Get U. S. government jobs. Prepare immediately for next examinations. List positions free. Write today. Franklin Institute, Dept. N3, Rochester, N. Y.

WATCH Repairing is steady profitable work. Experts always in demand. You can learn watchmaking trade at home, spare time. New original instruction system. Script engraving course included. Write for free details today! Nelson Co., H-2001 Manhattan Building, Chicago.

FOR An extremely profitable lifetime business, operate a collection-credit agency. Free folder. Cole Associates, Syracuse, N. Y.

ENROLL Now, decorating, paperhanging, graining, marbling, sign and pictorial painting. Catalogue free. Chicago Painting School, 437 North Clark Street, Chicago.

ENJOY Perfect health become professional equilibrist. 3 cents brings particulars. Knoff, 2154MA North 52nd Street, Milwaukee, Wis.

DRAFTING Jobs \$175.00-\$500.00 month. Quality now. Details free. Write Monroe Institute, C-88, Alton, Illinois.

WRITE For newspapers—gain pleasure, good pay and perhaps fame. Full time or freelancing (part time). Hundreds of stories, articles, ideas, are needed in every issue. We successfully coach you by mail. 45 years newspaper experience—plenty of contacts for placing graduates. The Millers, Dept. 10, Carmel, California.

OPERATE New advertising business. Refund customers' money. Retire on collections. Inexpensive training. Sure Sales Service, Empire Life, Indianapolis.

MASSAGE. Hydrotherapy, dietetics, drugless therapeutics, chiropody, taught by mail. Evans Correspondence School, Montgomery, Ala.

LEARN Auto mechanics, body, repairing, welding electricity, refrigeration, Diesel. Stevinson's, 2008A Main, Kansas City, Mo.

TELEGRAPHY Taught thoroughly. Railroad retirement act creating opportunities for new operators. Expenses low. Catalog free. Dodge's Institute, Hiatt Ave., Valparaiso, Ind.

GOVT Jobs start \$1260-\$2100 year. Men-women age 18-50. Former examiner's tested method helps qualify you. Particulars, list jobs free. Write today. Patterson School, 8C Mercantile Bldg., Rochester, N. Y.

SECRET Investigation. Experience unnecessary. Detective particulars free. George Wagner, M-2640 Broadway, N. Y.

TECHNICAL Bulletins. Many subjects. List free. Popular Mechanics, 200 E. Ontario St., Chicago.

PLAYS, STORIES, MANUSCRIPTS

BECOME A columnist—New book shows how. \$3. Folder free. Ben Arid. Station D. Los Angeles, Calif.

SONGS. Song poems, bought, published. Free information. Best offer. Metro Melody Music Publishers, 1204 Sutter, San Francisco.

FICTION. Poetry, plays criticized. Complete marketing advice. New York Publishing Service, 246 Fifth Avenue, New York.

BEGINNERS! Make splendid income weekly writing. Details, stamp. Fame, Lathrop, Calif.

WANTED. Poems, song manuscripts, for consideration, composing, publishing, transcription recording. Keenans Music Service, Dept. PM, Box 2140, Bridgeport, Conn.

SHORT Stories revised, typewritten, marketed. Hursh, Box P-1013, Harrisburg, Penna.

ORIGINAL Poems, songs wanted for publication, radio. Westmore Music Corporation, Dept. 33G, Portland, Ore.

CARTOONING, COMMERCIAL ART, SHOWCARD WRITING, SIGN PAINTING

EVERYONE Paints signs, showcards with Speedway Letter Patterns. Valuable 3 in. sample alphabet, enclose nickel. Free literature. Display Letter Co., Box 28, Fort Hamilton Station, Brooklyn, N. Y.

HAVE Your own money making business. Learn show card writing, sign painting. Write for details. Begley Specialty, 1472F Broadway, New York.

FREE Details! Learn original cartooning! Raye Burns School, Dept. MC, Box 2194, Cleveland, Ohio.

AMAZING! New idea! Manufacture sign letters. Complete course \$1.00. Photographic material 10c. Modern Signs, Phoenix, Ariz.

PEN And ink drawings. Let us draw your advertising and catalogue illustrations, from photos, copies or objects. Best work and fair prices. Heraldic Studios, 1914P Oakdale Avenue, Chicago, Ill.

AMATEUR Cartoonists wishing steady income copying and duplicating cartoons for advertisers, write Ad-Service, Argyle, Wisconsin.

MAKE Art Pay. Advanced art students. \$1.00. Popular Mechanics, 200 E. Ontario St., Chicago.

ADVERTISING AGENCIES, LETTER WRITERS, FOR ADVERTISERS

LEARN Advertising quickly at home. Easy practical plan. No text books. Common school education sufficient. Interesting booklet and requirements free. Page-Davis School of Advertising, 3601 Michigan Avenue, Dept. 349C, Chicago.

INCH Display advertisement 30 magazines, year \$24. Wood's Popular Services, Atlantic City, (N. J.)

ADVERTISE: 24 Words in 250 newspapers \$10. Lists free. Advertising Bureau, 4515-C Cottage Grove, Chicago.

SALES Letters. Lively! Enthusiastic! Energetic, quick-action letters that get business for you. \$2.50 each. 100% satisfaction guaranteed. Hutzletter, 41-44 Davies Building, Dayton, Ohio.

SELL Your product through agents, mail order. Advertise newspapers, magazines. Publishers' rates. Snappy layout your inch advertisement \$1. Martin Advertising Agency, 171M Madison Avenue, New York.

SELL By mail? Want agents? Our "guide-book" packed with helpful advice, rates, publications, sent for stamp. Chicago Advertising Agency, 20PK West Jackson, Chicago.

DIRECT-MAIL Advertising services. Sales letters that sell. Mailing lists. Omaha List & Letter Co., Box 2172, South Omaha, Nebr.

ADVERTISING Placed all magazines, newspapers, radio. Lowest rates. Free service. 54 page rate book free. Baker Advertising Agency, A-189 West Madison, Chicago. Successors to Ankrum. Established 28 years.

FREE—New Advertisers Rate Guide, 44 pages. Includes everything. Lowest rates. E. H. Brown Advertising Agency, 140 S. Dearborn, Chicago.

BUSINESS SERVICE

HAVE You real estate difficulties? Will help you solve them. Any question answered. \$1.00. Realty Service Co., 309 Burchell Bldg., Washington, D. C.

"CANADIAN" Mailing address. \$1 monthly plus postage. "Ramar," 525 5th East, Prince Albert, Sask.

RELIABLE Information, any subject. \$1.00 up. American Business, 79 Madison Ave., New York.

CANADIAN Mail address \$1 monthly. Merchandising Club, Confederation Building, Montreal.

CHICAGO Mail address—phone service. Daily forwarding. Also secretarial service. Hanock Company, 43 East Ohio.

LET Us merchandise your household ideas. Hoffman Lion Mills Co., Inc., Fall River, Mass.

NEW York City mail address. \$2.00 monthly. Graubard, 1650 Broadway.

MAIL Service: Mail addressed to your name, forwarded as you instruct us. \$1.00 per month. Harris Service Co., P.O. Box 505, El Paso, Texas.

CHICAGO Mail address \$1 monthly. Your personal, business mail forwarded daily. Established 1919. General, 56 West Washington.

RUBBER STAMPS AND OFFICE SUPPLIES

ORIGINAL. Cushion mounted. One, two lines. 25c; three 35c; four 45c. Stamp Works, 814 Bradley, Peoria, Ill.

2 LINES 25c, 3 Lines 35c. Stamp Works, Auburn, Nebr.

TYPEWRITERS, DUPLICATORS, OFFICE DEVICES

DUPLICATORS. Stencils, inks, ribbons. Catalog free. Wholesalers, 4854 Reading, Cincinnati.

INCREASE Business now. "Excelsograph" Rotary Stencil Printer reprints thousands everything you typewrite, hand-write, draw or trace. Colors. \$19.75 to \$44. Terms. Illustrated literature free to business or professional men. Pittsburgh Typewriter Supply, Department K-2, Pittsburgh, Penna.

NEW \$3.75 Automatic adding machine. Fully guaranteed. Bassett, Box 302-K, Altadena, California.

TYPEWRITERS. Adder, mimeograph, multigraph, addressograph. Send for free lists of machines that will help you at half price. Pruitt, 28 Pruitt Bldg., Chicago.

PRINTING, MULTIGRAPHING, MIMEOGRAPHING, GUMMED LABELS

BETTER Printing for less. Standard Press, 106 N. 17, St. Louis, Mo.

RECEIPTS. Statements, letterheads, envelopes, \$1.75—1000. Printco, Box 823, Huntington, W. Va.

WRITE Us before buying printing. Adkins Co., C601, Union, N. Y.

2000 BUSINESS Cards \$1.50. C. Zwickel, General P.O. Box 60, Brooklyn, N. Y.

6x9 CIRCULARS. Letterheads, envelopes, postcards, \$2.95 1000; 5,000, \$7.50—\$9.45. Folders. All printing low prices. Samples. Goodprint, Harrisonburg, Va.

SUITABLY Designed printing supplied quickly and cheaply. Samples. Slocum, 2038 Obeur, St. Louis.

100 NOTEHEADS. 100 Envelopes \$1.00. Columbia Printers, East Street, Pittsburgh, Penna.

500 "PERFUMED" Business cards—\$2.00. Rienzi Press, 31½ Sixth Ave., Newark, N. J.

1,000—\$2.00—BOND Letterheads, 6¼ envelopes, statements, Herald, Seymour, Iowa.

GOOD Printing. Reasonable. State your wants. Hamilton Printers, 1314 So. Racine, Chicago, Ill.

CIRCULARS. 6x9, 1000—\$1.85. Quantities cheaper. Warrior Press, North Birmingham, Ala.

2000 BUSINESS Cards \$1.50, 1000 envelopes, statements, billheads, \$1.75. Tilford, Box 516, Louisville, Ky.

LETTERHEADS. Envelopes. 125 each \$1.00, postpaid. Premier Printers, Clafin, Kansas.

CUT-RATE Printing. Quality, satisfaction, samples. Wickens Printing, West Lafayette, Ohio.

2000 BUSINESS Cards \$1.50. Letterheads, statements lowest prices. Samples. Florence Press, 270 Lafayette Street, Manhattan. (Agents wanted.)

QUALITY Business cards. 100, \$1.00 prepaid. Samples. Kylvia, Ft. Blackmore, Va.

FREE. 1000 Cards with \$10.00 order. Send copy for quotations. Globe, East Freedom, Penna.

SPECIAL. \$1.00—150 8½x11 Bond letterheads and 150 envelopes. Benneville, 907 West Roosevelt, Philadelphia.

500 BOND Letterheads 8½x11 \$1.00. Sample. M. Myhaluk, East Paterson, N. J.

1000 BUSINESS Cards. 75c. Catalog. Barjenco, 22c Fox, Worcester, Mass.

1000 ARCADIA Business cards \$1.50; 200 bond letterheads \$1.00; 200 6¼ envelopes 60c postpaid. Ottawa Press, Ottawa, Illinois.

50 LETTERHEADS. Fifty envelopes, printed, business or personal. \$1.00 with order. Dixie Press, Allendale, S. C.

250 8½x11 20 LB. Letterheads and envelopes \$1.50. Vicks Print, Exeter, N. H.

1000 BUSINESS Cards \$1.00. Vellum, free cuts. Dixie Business Card Co., PM189 Jefferson, Memphis, Tenn.

ANNOUNCING! Special offer. 1,000 modern thinplate pro-embossed business cards \$1.99; neatly printed, postpaid. Shinn's Shop, Bellflower, California.

PRINTING. Lowest prices. Quality work. Guaranteed. Talahi Press, Janesville, Wisconsin.

USE Printed stationery. 200 8½x11 bond letterheads. 200 6¼ envelopes, both \$1.00, postpaid. Franklin Printery, 2932 Pershing, Chicago.

2000 BUSINESS Cards \$1.50. General printing. Estimates cheerfully given. Florence Printing, 270 Lafayette St., Manhattan.

BUSINESS Cards 75c thousand. Letterheads, envelopes, statements, blotters, doorhangers, circulars \$1.95 thousand. Cut Rate, 7915 Fenkell, Detroit, Michigan.

PRINT Anything. Lowest prices. Samples free. Hamilton Press, 4341-P Meade, Chicago.

BOND Envelopes. 1000—\$2.20 postpaid anywhere in U. S. Samples. Feld, Elmwood Place, Ohio.

\$1.00 POSTPAID 125 Letterheads, 125 envelopes. Tucker, Box 65, Indianapolis.

1000 BUSINESS Cards \$1.00 post paid. Superba Print, 912 Towne, Los Angeles, Calif.

EXCELLENT Printing. Lowest prices. Free cut service. Okayprint, Martins Ferry, Ohio. Samples.

500 FRANCONIA Letterheads and 500 envelopes to match \$3.00. Richard's Print Shop, 271 S. Grand St., Orange, Calif.

HAMMERMILL Letterheads, 300 8½x11, any color paper and ink, \$1.48 postpaid. Free particulars. Woodruff's, 217A Lewis, Duluth, Minnesota.

500 2½x2¼ FOUR Line gummed stickers, 25c. Moritz Printery, Saginaw, Mich.

PRINTING OUTFITS AND SUPPLIES

BARGAINS — Presses, type, supplies. Send stamp. 159 Harvard, Cambridge, Mass.

PRINT Your own cards, stationery, circulars, advertising. Save money. Easy rules furnished. Print for others, big profits. Junior outfits \$9.00, senior outfits \$17.00 up. Details free. Kelsey Presses, D-11, Meriden, Conn.

PRINTING Shop \$800 cash. Press, 209 South Upper, Lexington, Ky.

LONG Established printers warehouse. Big lists 3c. Landis, Richland, Penna.

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THERE RIGHT WELL

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NUMBER OF INTERESTING
SIGHTS, BUT THE THING THAT
IMPRESSED ME MOST WAS
THE NUMBER OF MEN I SAW
REALLY ENJOYING
THEIR PIPES

YOU MEAN THE
PRINCE ALBERT SMOKERS,
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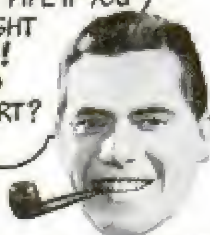
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PIPE PLEASURE

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WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 72

AUGUST, 1939

No. 2

9-6-14 The *Leggett* ELECTRIC HOME of the FUTURE



By George H. Bucher

President, Westinghouse Electric & Manufacturing Company

SPARKS leap from your fingertips when you walk across a carpeted floor. Lightning strikes from the sky. Water changes to steam and giant turbines whirl magnets within magnets to light the world and drive its machines.

Because man has tamed this invisible, omnipresent electric force and harnessed it to his tasks, today's civilization depends almost for its very existence upon its uninterrupted flow.

Electric power moves silently, ceaselessly, over thousands of miles of wires leading from more than 1,650 central power stations in the United States. It comes into our homes and factories and offices with such dependability that we take it for



Bottom, cooking ham sandwich in high-frequency radio waves. This method may be common in the home of the future

Westinghouse Electric & Mfg Co



Left, the electric home of the future probably will have heated walls, laid out on this plan. Center, the electric laundry is here, but tomorrow is apt to bring many refinements. Bottom, engineers already have saved the housewife many steps by arranging kitchen equipment on two sides instead of four

granted. But what does it really mean to us?

Thirty years ago, the housewife could look forward to washing and drying 28,000 dishes, pots and pans and some 16,000 pieces of silverware every year. In thirty years she would wash enough pieces to make a stack almost eighteen miles high, the equivalent of seventy-six stacks of dishes as



it takes from 200 to 325 steps to prepare a single meal, but with the advent of electricity and planning, kitchen mileage was cut seventy-five per cent, a saving of ninety-five miles, or about the distance from New York to Philadelphia.

It requires an average of 1,083 lifts of an iron to hand-iron the weekly laundry for a family of four. Since the ordinary iron weighs between four

tall as the Empire State building. Today an electric washing machine washes and dries more than 100 pieces at a time, using water at 140 degrees Fahrenheit, so hot that microbe growth is checked.

Before electricity and planning reached the kitchen, this same average homemaker walked 125 miles a year preparing meals. Studies show that in an ordinary kitchen

and eight pounds, this means that the housewife lifts more than two tons at each session at the ironing board. Electric ironers do the job without any lifting and iron twenty-four square feet a minute.

Manufacturers have come to look upon the design and distribution of home appliances as a long-term job of making electric homes. Today's house is a series of



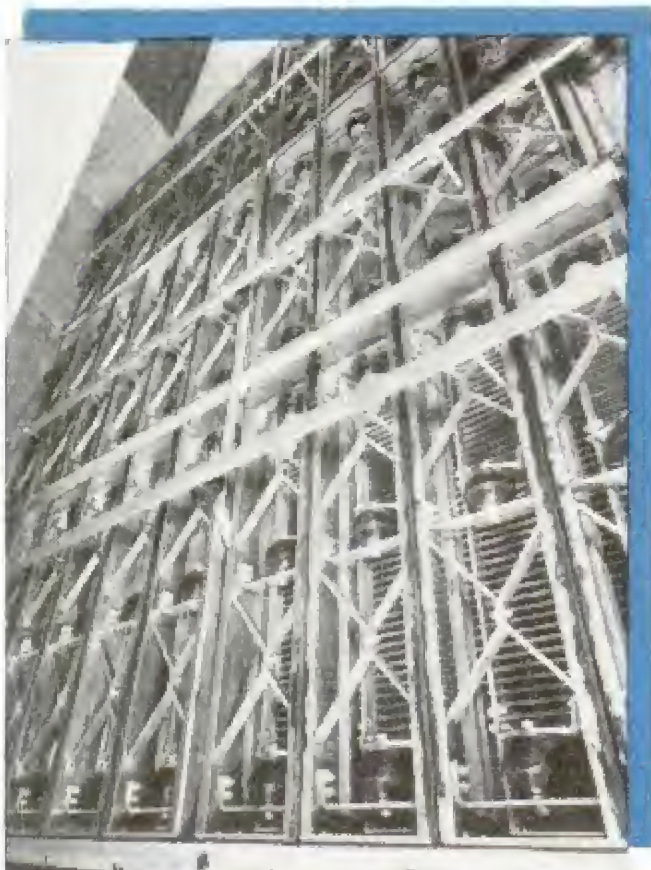
separate centers of electrification. Tomorrow's electric home will be built around the electric power supply and appliances. To achieve this ultimate in electrical living will require the resources of research, engineering and manufacturing knowledge and experience.

This future home will probably be equipped with a number of control centers, from any one of which the homemaker can give her commands to appliances at work in the kitchen and laundry. Electric ranges already are equipped with automatic controls for temperature and cooking time, but there is no practical reason why these operations together with the other appliances cannot be controlled remotely from any room in the house. Perhaps short-wave radio may be utilized for this purpose, as well as for answering the doorbell and receiving visitors by transmitting a



- | | |
|---------------------------|----------------------------|
| 1. Refrigerator | 9. Ironer |
| 2. Range | 10. Dryer |
| 3. Dishwasher | 11. Sink, Water Heater |
| 4. Sink, Water Heater | 12. Wall Cabinets |
| 5. Mixer, Light, Cabinets | 13. Cabinets, Counter |
| 6. Cabinets, Counter | 14. Breakfast Nook |
| 7. Wall Cabinets | 15. Children's Play Room |
| 8. Automatic Washer | 16. Desk, Telephone, Radio |
| | 17. Portable Table |

Top, artist's rendition of the combination room in the electric home of tomorrow (see floor plan below and the various electric equipment engineers expect the room to contain). Note the glass brick wall



Above, one side of the air-cleaning Precipitron. Right, household lighting sources similar to this peanut-size mercury lamp may provide brilliant illumination in tomorrow's home

greeting to them and unlocking the door.

The time may come when we shall use short-wave radio frequency to cook our food. In fact, Westinghouse research engineers have succeeded in cooking hams in a radio frequency field in forty minutes as compared with four to six hours normally required to cook them with steam. Of course this is only a laboratory achievement today, and it is too early to say that it will prove practical in general application. But it has distinct advantages. Ham cooked by steam loses up to ten per cent of its weight, while radio cooking dissipates only three and one-half per cent.

In the not-distant future, the home may well be equipped with "mood control," which is made possible by newly developed light sources. It's possible that people will suit the light and color of their rooms to their moods. These new-type lamps produce colors of warm white, daylight white, gold, red, blue, pink and green. It's up to the psychologists to figure out the proper combinations of colors to lift one's spirits, when they are down, with a flood of brilliant light, or subdue a sense of excitement with soothing mellow light.

These new lamps are highly efficient colored-light makers, producing from ten to fifty times as much light per watt as has been possible with incandescent lamps. They utilize a very low-pressure mercury vapor discharge which produces ultraviolet radiations, giving little direct visible light or heat radiation. The inside surface of the glass tubes is coated with chemicals which glow when struck by invisible ultraviolet radiation. The combination of chemicals used in the coating of the lamp determines the resultant color.



It is even possible that in the future we may produce on a commercial scale similar lights by bombarding the fluorescent material of the lamps with short-wave radio beams.

Still other lamps may be made to keep the plants of future soilless farms at work day and night with only minimum rest periods. The scientific farmer or the amateur gardener may simply turn on a switch and flood his plants with light. This will necessarily be a different kind of light from that used in reading lamps, for plants utilize principally the blue and red wave lengths of the sun's visible spectrum in getting their energy of growth. This lamp would concentrate on the production of these two specific wave lengths.

Air conditioning in its widest possible meaning will undoubtedly play a role in the next generation. Even now the Precipitron, an electrostatic air cleaner, is at work in homes, offices, hospitals and fac-

Developed by George W. Harrison and Dudley Research

tories, literally electrocuting dust and dirt out of the atmosphere. This job of ridding the air of dust is one worthy of a Hercules, because as many as 10,000,000 individual particles of smoke and dust have been counted in a single cubic foot of air in one industrial city, and an average city ordinarily has between 500,000 and 2,000,000 particles to a cubic foot of air. The Precipitron, however, eliminates more than ninety-five per cent of such air-borne particles by charging them with electricity and then drawing them off to oppositely charged collector plates. Housewives will appreciate what this means in keeping rugs and curtains clean. When the Precipitron is allied with a compressor mechanism the result is controlled temperature and pure air indoors.

An essential phase of air conditioning in the future will certainly be the eradication of air-borne bacteria from homes and public buildings as well as hospitals. Man-made "sunlight" is already available for this attack on disease. As a matter of fact, the "Sterilamp," which is the most efficient bactericidal ultraviolet source yet devised, is already in service sterilizing the air in hospital operating rooms, protecting eating utensils in restaurants, and preventing mold formation on cosmetics and baked goods. This device has now made possible the tenderizing of meat on an economical basis. The "Sterilamp," installed in refrigerators, carries its sterilization benefits into the home, a new adjunct to modern refrigeration.

Most people are familiar with the operation of electric refrigerators, but few realize that this refrigerating process can be reversed to heat their homes. The future may possibly see wide use of this unsuspected heat source. Utilization of cold outdoor air to heat a building is not at all impossible. As a matter of fact, Westinghouse engineers recently installed such a reversed refrigeration heating plant in an office building.

Of course the future home will be equipped with both radio and television. No one can foresee the possibilities of television. It may change our whole concept of entertainment and move the amusement centers of Broadway and Hollywood right into our living rooms. The home of tomorrow

(Continued to page 135A)

Helmet Guards Ball Batter from Head Injuries

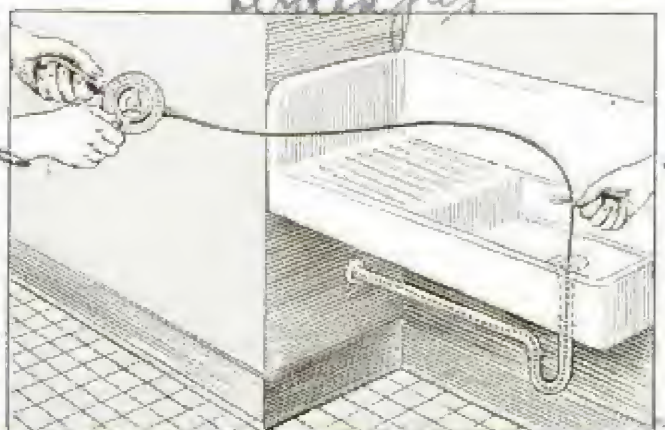


Baseball player shows how he places head protector under cap so "bean" balls will bounce off harmlessly.

Having been hit on the head by a pitched ball last season, Lamar Newsome, an infielder for a major league team, wears a helmet under his cap while at bat to guard against a similar accident. The protector, made of felt, is similar to those worn by Australian steeplechase jockeys.

Hand Crank for Cleaning Drain Bores through Obstruction

Obstructions in drain pipes can be removed by a flexible shaft that reaches six feet or more into the drain. Built like an egg beater, the cable works its way down the clogged pipe as the handle is cranked.



One hand holds clip over drain while crank is turned, driving shaft into pipe to remove obstruction.

Westinghouse Lamp

Stow Mfg Co. Inc.

442 State St.

Singhram's key

Glass Jar Generates Steam in Fifteen Seconds



Jet of steam superheated to 350 degrees emerges from tip of "bottle" fifteen seconds after plugging in

Superheated steam is generated from tap water in fifteen seconds by electric coils in a glass "bottle." Intended for use in sterilizing surgical instruments, for keeping restaurant steam tables hot or sterilizing dishes, and other jobs requiring a small jet of steam, the glass boiler plugs in on an ordinary electric circuit. Inside it are coils of resistance wire wound on a porcelain core. Connected to the tap for continuous operation, it converts five pints of water into steam in an hour. With only the lower part of the coil immersed, the tip of the coil superheats steam passing over it, raising its temperature to 350 degrees. When the boiler is full, however, it becomes a quick heater, producing enough hot water to shave or wash in a minute or two.

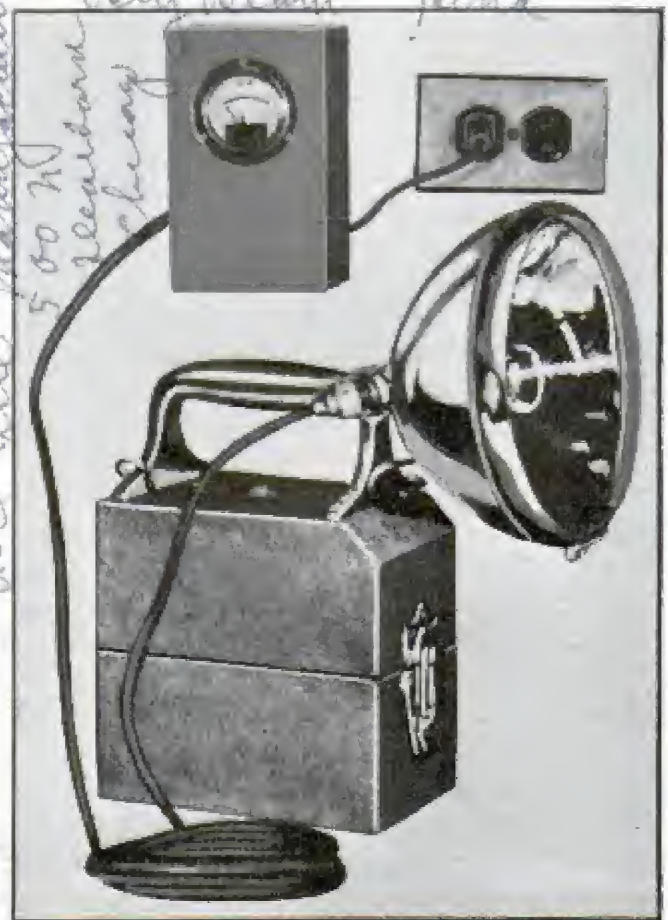
Air Liner with Its Own Refinery Could Crack Starting Fuel

Giant air-transport ships of the future may carry their own oil-cracking plants as one solution of the demand for more powerful fuels without increasing the menace

of fire. Safe, slow-burning fuels can be used in airplane engines but only after a gaseous or volatile liquid fuel is used for starting, and carrying this starting fuel adds to the fire danger. Two petroleum experts have suggested that a small electrically heated oil refinery could be installed on the plane to crack safety fuel or lubricating oil and develop its own starting fuel as needed.

Spotlight Fed by Storage Battery Throws Beam a Half Mile

Powerful enough to throw a strong beam for more than a half mile, a portable lamp just brought out is operated by a storage battery. The big light will burn ten continuous hours on one full charge of its battery, and an auxiliary bulb on an independent switch will burn sixty hours. Because of its high power and ease of handling in the field, it is especially adapted for fire and police departments, for coast guard and other marine work, camping, night construction and utility crews, for watchmen, farmers and many other uses.



After ten continuous hours of use the storage battery operating this portable lamp can be recharged

'Golf Tees' Support Roof of Windowless Office



Above you see no model of building of future, but the office of S. C. Johnson & Son, Racine, Wis. Two air intakes at top are called "nostrils" by architect, Frank Lloyd Wright. Skylights and unseen fixtures supply light in the windowless building



Center, glass-enclosed bridge linking two buildings. Above, glimpse of tapering "golf tee" columns which support roof. Circular stairways between floors save space. Reception hall is seen below



Above, the circular "bird-cage" elevator. Radiant floors heat the building, steam pipes being laid under the four-inch concrete slab. Without a conventional front door, entrance is through a roofed-over auto driveway. Near by is a "carport" for parking, and on its roof a theater and a squash court

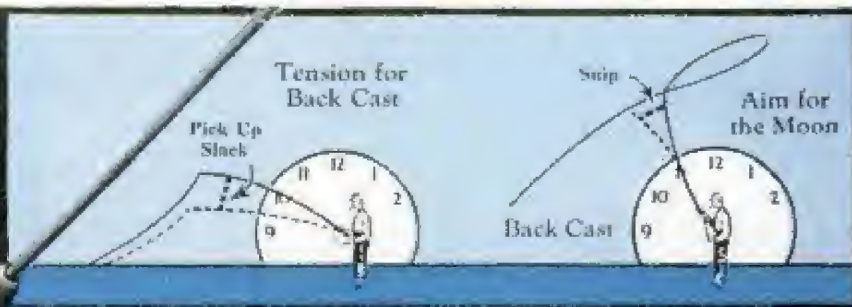


acme

Chama River



CATCH 'EM



By Tony Accetta

All-around Bait and Fly-Casting Champion

8538 144 N. Cleveland Ohio
FISHING may be America's favorite sport but comparatively few of its fifteen million enthusiasts get the results they should.

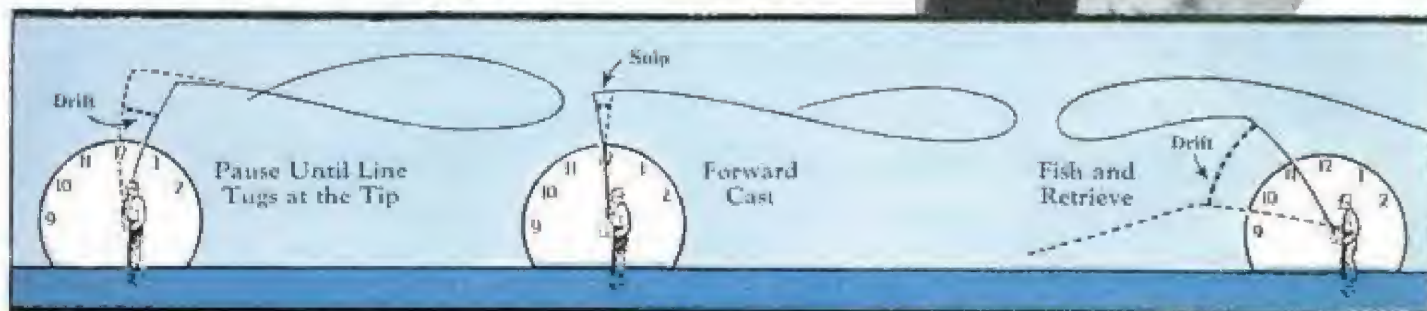
The reason is simple. There's no substitute for correct fundamentals. Unless a person takes the trouble to learn them he can never hope to be a good caster. And good casting means putting a lure where you want it, when you want it there, with minimum effort.

Let's begin with the overhead cast. The correct form is to have your palm down on the handle with one edge of the thumb pressing on

Top, landing a rainbow trout in fast waters. Bottom, holding a book between elbow and side helps the beginner to keep his elbow in close and use the wrist alone for casting



on the FLY



At top, start of back cast, momentary pause before forward action, and backward action on overhead cast. "Clock" diagrams across pages illustrate positions of rod and line in casting

the line of the spool, the rest of the thumb on the reel plate. Grip the reel so the handle is on top. For accuracy, hold your rod high enough so its first guide is in line with your eyes and the spot at which you are aiming. With your elbow close to your side, bring the rod back fast; then with a snap of the wrist, bring it forward twice as fast. The action is in the wrist, not the shoulder or body.

The pressure you apply to the line on the spool regulates the distance and accuracy of your cast. Too much pressure will

shorten a cast appreciably, too little is apt to result in a backlash. However, you do want to ease the pressure on the forward movement, lifting your thumb momentarily when the rod is in virtually the same position as when you started, then reapply pressure as the line starts on its way.

The majority of beginners either take the rod too far back or hesitate while making the back cast. In either case, the rod loses its spring and lacks the power to shoot forward the line.

For a left-handed cast, the procedure is



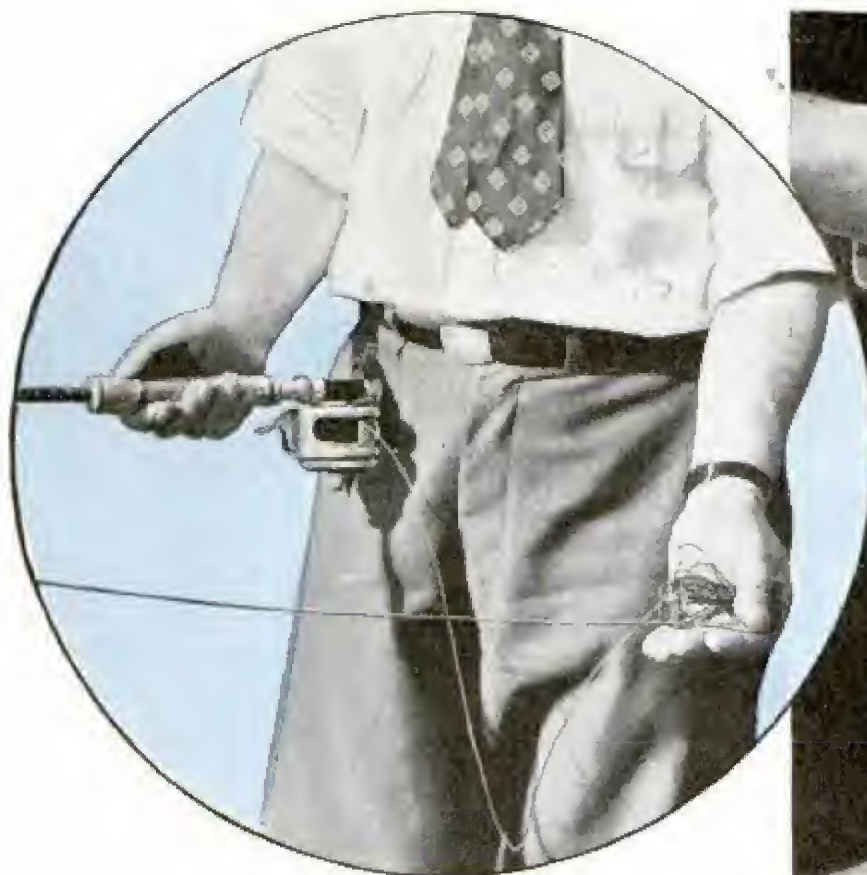
the same except that the handle of the reel is down. One advantage of a left-handed cast is that you can begin retrieving at once. A right-handed fisherman has to shift the rod before he can bring in his line. It's well known that an underwater bait will catch more and larger fish if the lure strikes the water moving. A fish has more time to inspect a lure that stops while the caster changes the rod from right to left hand.

Fly casting is easier to learn than bait casting because it does not call for proficiency in thumbing a reel to avoid backlashes. On a fly rod, the reel is only a line carrier and a light one of sufficient size to hold the line without crowding is all that's needed. Fly casting consists in first lifting the rod slowly to take up slack, then whipping rod and line over the head, pausing for the line to straighten out, then snapping it out in front again, high over the water. A back cast and a forward one.

A good place to master the art is on an open stretch of grass. Put down a marker as "home base" and then ten yards or so away, set out another—an old bicycle tire or newspaper. As soon as you string your line through the guides, leaving off the fly and leader, run it



Fisherman at top is demonstrating backward swing of side cast; observe elbow close to side. Wrong and right ways of making overhead cast are shown at top; handle should be on top, thumb resting partly on spool and reel plate. The dub holds thumb on spool and handle at side. Bottom, three stages of side cast for fishing beneath overhanging trees



straight to your target and drop it. Return and pick up the rod with the right hand, making sure your thumb is straight on top of the handle. Take hold of the line between the first guide on the rod and the reel with your left hand and keep it there on a level with your trouser pocket. As in bait casting, keep your elbow in close, using only your wrist.

Regulating your movements by an imaginary clock will help develop your sense of timing. At the outset, your line is perfectly straight in the grass or water, your rod lowered to what is approximately 9:30 on the clock face. Raise the rod to 10 o'clock, or until the slack is out of the line. Then snap rod and line upward as if aiming at the moon, stopping your rod at 11 o'clock. The "snap" can be confined to the fifteen minutes between 10:45 and 11:00. Mark this point well—the success or failure of your back cast depends on it. Pause as the line travels up and back, allowing the rod to drift to 12:30, then slowly advance your rod to about 12 o'clock, and at that point pause momentarily, then snap the line forward. Be sure you make your forward snap with your rod at 12 o'clock and that it travels only the fifteen minutes between 12:00 and 11:45. Above all, don't

(Continued to page 136A)



In circle, the author makes "figure eights" with his line, finding this more efficient than wrapping it around his hand or letting it gather at his feet. Right, the overhead cast for accuracy and distance

Paper Mask Saves Dresses from Stain of Lipstick



With paper mask held by teeth, lips are covered and lipstick cannot stain dress as it is tried on

Rouge stains on new dresses tried on by women customers are said to cost dress shops and department stores several million dollars a year. An American college professor has solved the expensive problem by inventing a paper mask which covers the lips while the dress is pulled over the head. A small tab inside the lipstick mask is held between the teeth.

Split Ball Gauge Measures Small Inside Dimensions

Tiny gauges for measuring small holes and inside dimensions have just been put on the market in sets of four, measuring progressively from one-eighth to one-half

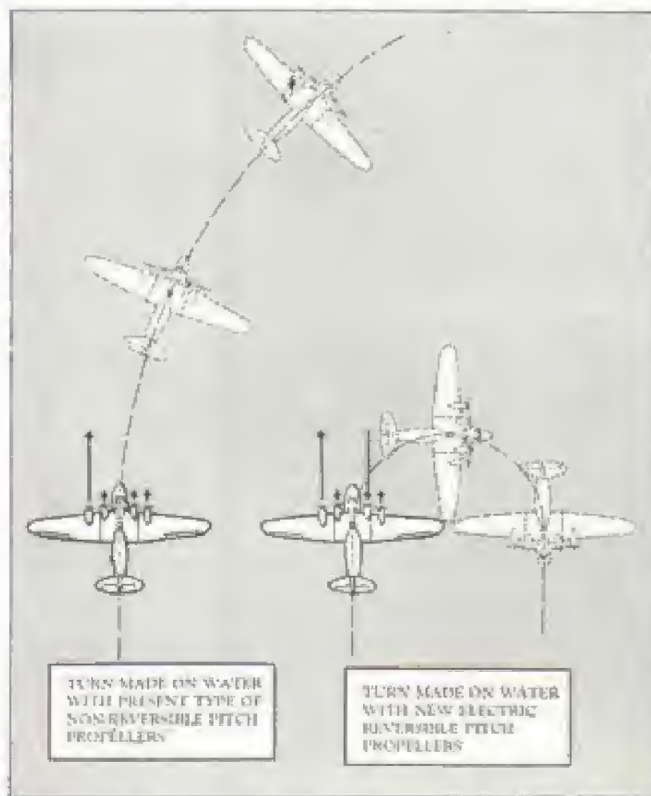


Split ball at end of gauge is expanded by a cone when knurled knob is turned

inch and intended for use where the holes are too small for the ordinary telescoping gauges. A split ball at the end of the gauge is expanded by a cone controlled by a knurled knob. Placed in the hole, the ball is expanded and the measure transferred to a micrometer.

Pilot Reverses Propeller Pitch to Turn Flying Boat Quickly

Development of an electrically operated reversible-pitch propeller that creates a backward thrust to facilitate maneuvering big flying boats on the water has just been announced. Curtiss-Wright engineers designed the propeller with the cooperation of navy aeronautical experts particularly



Length of arrows indicates relative amount of power applied to propellers in executing right turn

for use on four-engined patrol planes or commercial flying boats. By operating two propellers in reverse pitch and two in normal position, the blades can be used as brakes to slow down the ship, to turn it sharply within the radius of its own wing span or even to back up. The change to reverse pitch is made quickly and simply by moving an electric switch in the cockpit. The reversible propellers may eventually be installed on land planes to act as air brakes for slow landings.

Curtiss-Wright Corp
30 Rockefeller Plaza
New York City

Ball Park Lamps Would Light 2,000 Homes



used by American League Cleveland team

Illumination engineers say that Shibe Park, Philadelphia, (shown at top) is the world's best lighted baseball field. Its two-billion candlepower floodlighting system has intensity sufficient to light 2,000 homes. This view shows the park as seen from grandstand. Bottom, left, closeup of one of seven hundred and eighty 1,500-watt Westinghouse floodlights in the system. Right, daytime view of one of the eight towers, each of which sheds enough illumination to light 250 average homes. There are 110 floodlights on the target above the tower and they use enough current to light 2,700 sixty-watt incandescent lamps

Forest Fire FIGHTERS



from the airport. A one-way trip by pack train would have taken two weeks.

From the bombing plane the packages of supplies had to be unloaded one at a time over the side. Trap doors in the bottom of the new plane speed up unloading. Supplies to be dropped are wrapped in fifty-pound packages attached to burlap parachutes folded in accordion pleats.

FOREST Service firemen are waging warfare from the air on the worst enemy of the American woods. They have acquired airplanes to replace pack animals in speeding fire supplies to isolated areas of the deep forests; have adopted parachutes to do the work of fire-line runners, and are using radio in reporting outbreaks of fire and in directing the work of ground crews of remote areas.

Up to this season the work has been carried on from bombing planes borrowed from the Navy. This year the service is using a brand new machine, built especially for forest work at a cost of \$15,000. The fire ship has been assigned to Klamath National Forest, but will operate in other areas within 1,000 miles in emergencies.

Last year a fire ship serviced crews of more than 10,000 men in a series of fires raging in northern California. Operating from Montague on Shasta river, the plane dropped 60,000 pounds of food, tools, kerosene and chemicals to ground crews near the mouth of the Klamath river. The ship made six round trips in the average time of two hours to one fire more than seventy miles



"Blister" sighting device, 'chute with supplies, and dropping supplies from bomber

g 560
with

Carry-along
Angies National Forest
WINGS

Right, "fire truck of the air."
Bottom, left, the great de-
stroyer at work. Right,
voice amplifier (just back of
exhaust) enables fliers to
shout to ground crews fight-
ing the flames

San Francisco



airplane: E. Timmer, Aircraft
Corp. Wayne, Mich.



The "fire truck of the air" plays an im-
portant role in the isolation of fires. When
a blaze starts in a remote section of tim-
ber, a plane now can circle over the burn-
ing area, dropping a ring of chemicals to
confine the flames within a small space, or
unloading cans of kerosene for back firing.

Two-men or three-men crews are car-
ried in addition to the pilot. One of the
crew mans the radio while the others are
unloading as the ship circles low.

Woodsmen-engineers devised their own
air sight, which they call a "blister." It is
a big windshield attached to the outside of
the plane, just above and to the right of
the cockpit window. It permits the bomber

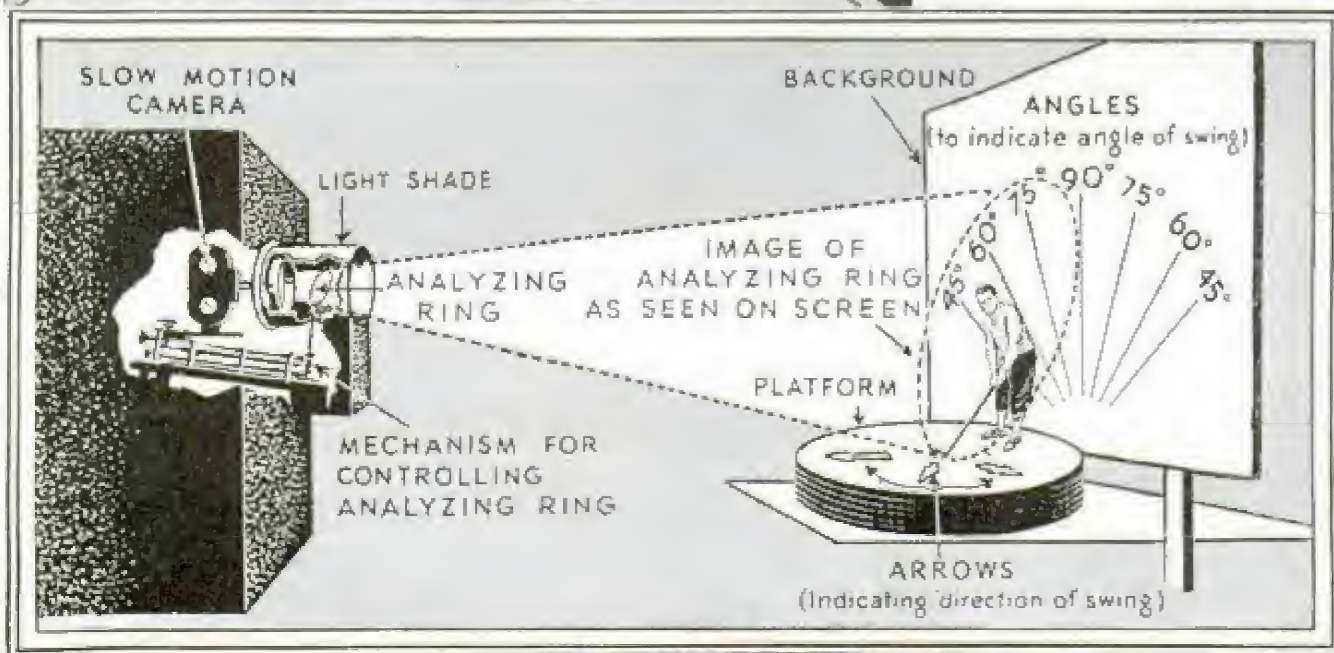
to look ahead and down at his target. A
handle, just below the "blister" and outside
the plane, is pulled to release the cargo
from a bin through trap doors in the bot-
tom of the plane. When the bin doors open
outward, bombs, chemicals in containers,
or supplies on parachutes tumble out and
clear the body of the plane.

The cabin of the new fire ship is twelve
feet long, soundproofed and ventilated. It
will carry a cargo of 1,250 pounds and has
a flying range of 800 miles. A voice-ampli-
fier enables the fire chief to shout instruc-
tions to ground crews from the plane.

Slow-Motion Pictures Analyze Golfer's Swing

What's wrong—or right—with the golfer's swing is brought out clearly by slow-motion pictures filmed with scientific precision by a "swing analyzer" developed at the New York Museum of Science and Industry. The visitor steps up on a circular platform, takes three cracks at the ball from different angles, and two or three days later he can see the film projected and

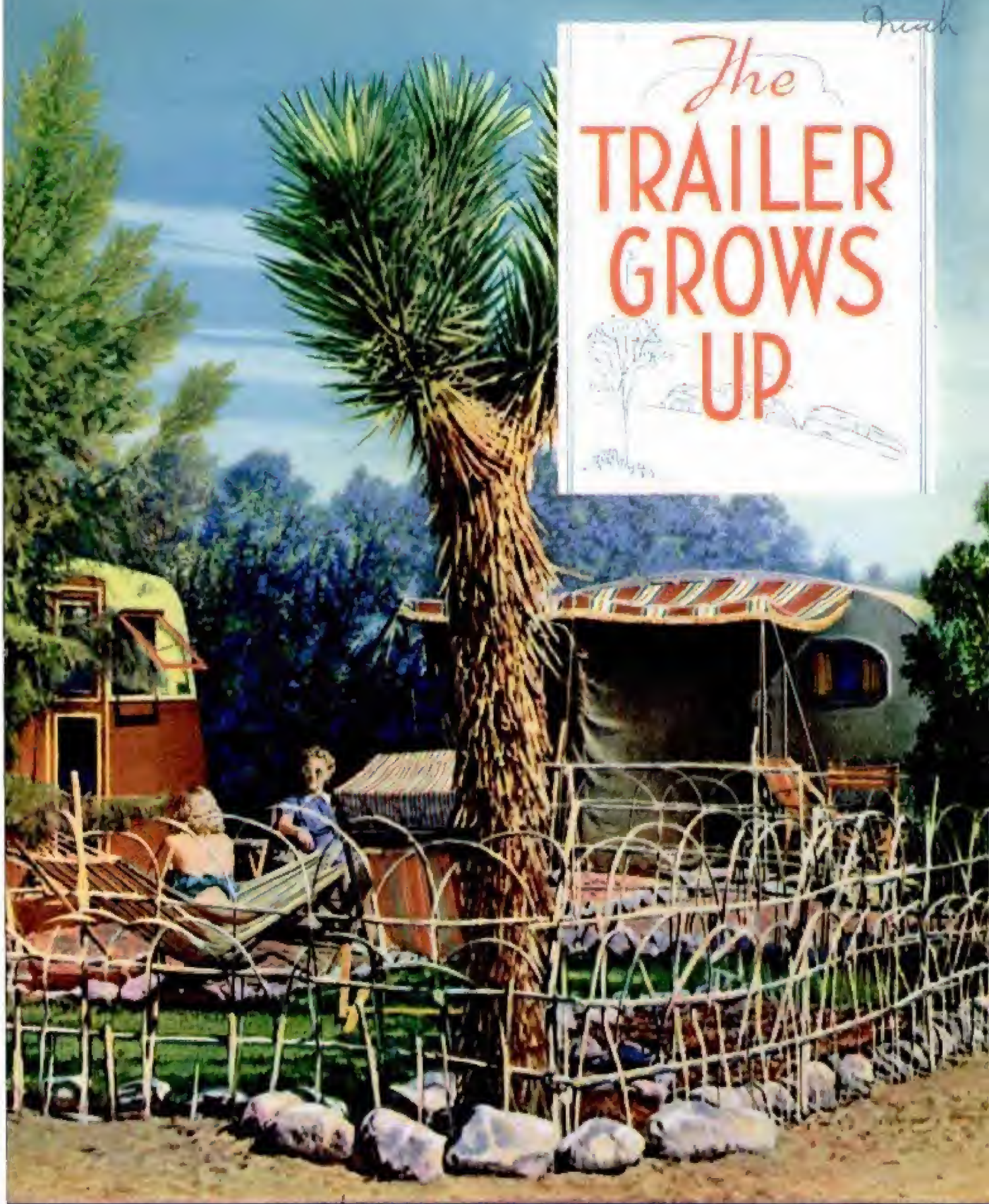

observe his faults. A fundamental part of the analyzer is a cleverly geared ring mounted inside the light hood in front of the camera lens. By manipulating various control knobs, the movie operator can set this analyzing ring at the correct angle to conform with the golfer's position. Then if the golf club head swings outside the circle or ellipse formed by the ring, the picture shows the golfer how he deviates from ideal rhythm. The image of the adjustable ring is designed as a standard for a good swing. If the club head does not follow the path of the ring, if the golfer pulls up his head, twists his body, overswings or fails to follow through, the film tells him what is wrong. By studying his own swing with this analyzer, Robert P. Shaw, director of the museum, has brought his golf score down from the low nineties to the low eighties. Not intended to replace the golf teacher or textbook, the movie helps the player study his own game.



Bottom, diagram of camera set-up at New York Museum of Science and Industry showing analyzing ring which indicates on screen the rhythm of golf swing. Above, frame from slow-motion picture of swing

*Elmer
Mink*

The TRAILER GROWS UP



147 *near Phoenix, Ariz.*

HOME could hardly be more comfortable, and not half so healthful, as this attractive trailer camp. Note awning used with trailer in background and the inviting outdoor furniture.



NEW, at top, and old at left, in trailers. The latest equipment really is a comfortable home-on-wheels in which you can spend as long as you like at scenic spots. Trailer at left is first built by Arthur G. Sherman.

By Julian Leggett

FROM the time, only ten years ago, when it was little more than a big wooden box perched precariously between two wheels, the trailer has come a long way.

Just recently, an auto-and-trailer unit was traveling the desert road beside the Salton sea, with the speedometer needle hovering close to seventy. As the driver picked up the telephone to inform his family in the trailer that they were nearing their destination, there was a loud bang. The driver felt a quick tug at the steering wheel, a sudden drag on the car. But nothing else happened. There was no loss of control, no careening. Cautiously he set the brakes and brought the

two vehicles to a stop. Investigation revealed that one of the trailer tires had blown out—at seventy miles an hour—yet not even a dish was out of place in the trailer's cupboard.

Had this happened in the early days, a serious accident might have followed that blowout. But today's trailer is built for safety and comfort, carefully engineered to withstand the road hazards likely to be encountered at the high speeds demanded by the modern motorist. Factory-constructed models of the 300,000 rolling homes on American highways boast such features as:

Quick-acting hydraulic or electric brakes; channel steel underframes

Cause for use of trailers. Published by National

AWNINGS, easy to put up and take down, lend an extra touch of hominess to modern trailer. Below, left, car hitch arrangement, showing ball at end of drawbar. Right, trailer connections. Note double-cylinder hydraulic brake unit and mount pin for car unit. Tubular tripod supports front of trailer and auxiliary chain, required by law, adds to safety.

Installed by

Howard J. Ward, Inc.

*1058 S. H. Lower St.
 Los Angeles, Calif.
 including labor \$75.00*



with trees; safe space and water heaters; electric lights; disappearing wash basins; soft, folding beds; screw-type ventilators operated from inside the trailer; screened and storm windows and even collapsible rubber bathtubs.

Gasoline consumption, in pulling a trailer, approximates only one mile less per gallon than when the tow car travels alone. One reason for this is that the modern trailer is lightweight.

The trailer on which the tire blew out at seventy weighed only 1,100 pounds. Years of experimental building showed engineers that lightweight construction is not only the most economical but also the safest. Most motorists have only to close their eyes to picture yesterday's box-on-wheels swaying dizzily down the road behind the tow car.

Engineers for the Covered Wagon company, a pioneer in this \$25,000,000 industry, point out that a trailer acts like a whip lash in going around curves because centrifugal force pushes it around like a boy playing crack-the-whip. In negotiating a curve the trailer tends to pull sideways and to slew the rear end of the tow car toward the out-

179 rugged bodies of oak, elm and airplane spruce; steel-clad plywood walls; spun glass or similar insulation; ball-and-socket couplers that practically eliminate the possibility of the trailer breaking away from the tow car; drop-type windows that disappear into the walls instead of swinging outward at eye level to create a night hazard; cookstoves with steel safety shields and asbestos wings for protection against fire and hot grease; electric refrigerators that freeze ice cubes and retain their low food-preserving temperatures for fourteen to eighteen hours between stops; steel rub rail around the trailer at the lower edge of the body to afford protection from contact



Warner Electric Brake

2-83

FISHING stories must be good, if they are to be believed, when told right on the scene. Here a party of sportsmen relax after a day's angling and the trailer enables them to get the utmost pleasure on their outing.

side of the curve. So today's rolling home, combining light weight with equal strength, is built a little wider than the automobile, resulting in smooth travel at speeds up to, and sometimes exceeding, a mile a minute. As every motorist knows, light loads are also more easily controlled. Some factories refuse to build trailers heavier than 3,500 pounds and the small-size trailer rarely weighs more than 1,500 pounds.

Another important factor is braking. The hydraulic system is operated on both tow car and trailer by the same foot pedal, thus giving pressure on every wheel of the unit. The Warner electric system is controlled by a fingertip lever mounted on the steering post of the tow car. These brakes are installed on the trailer, entirely separate from the tow car's brakes. Operated in conjunction with the automobile's brakes, the system affords a powerful, quick-acting means of stopping the two vehicles. In connection with electric brakes, the trailer owner may install a small attachment operated by a flashlight battery to lock the trailer brakes for thirty minutes. Thus, if by any chance the trailer should break away from the tow car, this device would set the brakes automatically and hold the trailer long



*Warner Electric Brake - 88
C. C. C. Co. C. C. C. Co.*

282
283

HANDY storage compartments like the one at right have been engineered into the modern trailer. Here fishing or hunting gear may be placed in safety and forgotten until needed again.

PROTECTION for both trailer and the tow car is provided, below, by tent erected by camper in Yosemite National Park. There also is sufficient space for the family to sit in the inviting shade.

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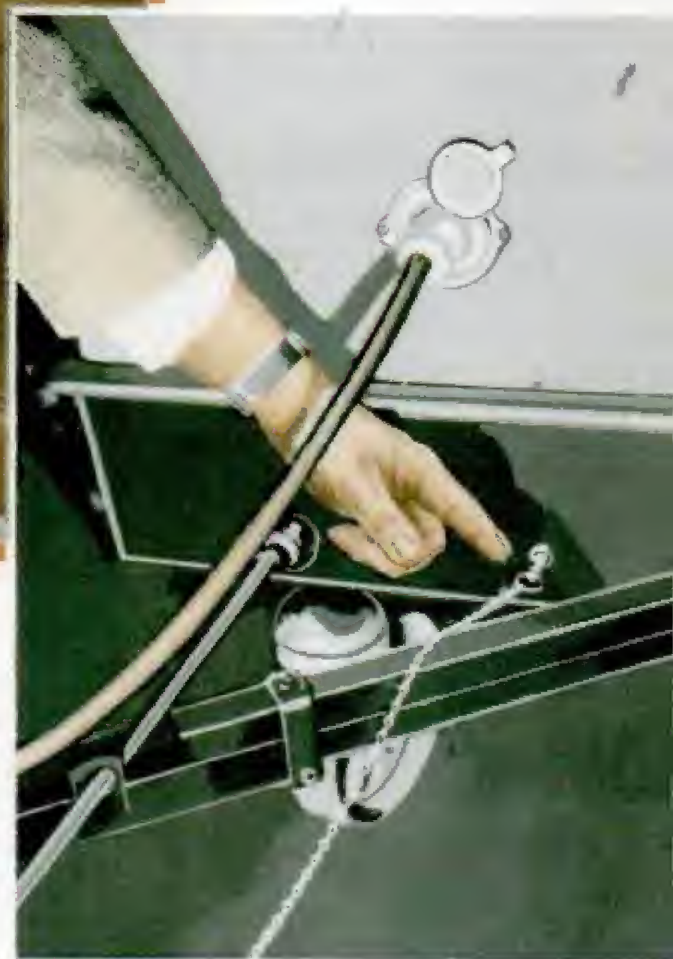




Covered Wagon

SAFETY is feature of metal shield for stove cabinet, at left. Ventilator, above stove, carries away smoke and fumes. Center, if small chain is jerked, a safety device sets electric brakes on trailer. Bottom, simple railroad type coupling used on Covered Wagons. Coupler is locked to coupler ball with throat latch, pins and a safety pin.

883



182
enough for the owner to stop, back up and re-establish the hitch and electrical connections.

Experienced owners recommend the small trailer because it is comfortable, yet lightweight and therefore more easily handled in making or breaking camp. Today, one company is offering a trailer priced below \$400, which has adequate cabinet space, plenty of shelves, a wardrobe room, sleeping accommodations for two, kitchenette with sink, ten-gallon water tank and many other features. Seventeen feet long with steel underframe, this trailer has combination six-volt and 110-volt electric-lighting system. It is well sealed against the weather. Compared to the cumbersome trailer of the early days, this model offers real luxury at low cost.

Another tip to the trailer owner is not to load down the rolling home with extra equipment. Veteran travelers pride themselves on how little they can get along with. Of course, if the trailer is not already equipped, these items are regarded as essential:

Safe braking system; three-burner gasoline cookstove, because the fuel is easy to obtain



from filling stations or from the tow car's tank; small six-volt fan which may be mounted at the roof ventilator to speed up discharge of fumes and cooking odors; fire extinguisher; some safe space heater; adequate sanitary facilities; electrical wiring strong enough to serve all the owner's needs.

Owners of early-day trailers experienced a lot of trouble with the coupling. Frequently the hitch was unsafe. This hazard has been overcome by the ball-and-socket coupling. The hitch is mounted on the tow car by bolting and welding it to the chassis frame, instead of onto the bumper alone. Covered



SLEEPY-TIME no longer is the dreaded hour for the trailerite for the davenport is convertible into a soft bed (top). Decorative fence added to appearance of camp at Palm Springs, Calif.



184 **COMPANY** is what the modern trailer traveler will have almost any place he goes, for there are about 300,000 rolling homes on the road. Here is an attractive camp in a scenic spot. Note various forms that trailer construction has taken.

Wagon engineers employ a railroad type coupler which permits the trailer to be attached easily by backing the tow car into the coupler attachment without the necessity of raising the trailer drawbar above the coupler and then dropping it down on the coupler ball, as is necessary with other types. The coupler is locked to the coupler ball with a throat latch, pins and a safety pin so that it cannot come off, thus making for greater safety.

In this connection, an "overload" or auxiliary rear spring is recommended by many engineers for the tow car. This spring does not come into play until the regular spring is depressed to a certain point. Although the trailer may not put an extra heavy load on the car's rear springs, a passenger or two aft makes a big difference, particularly if riding forward in the trailer. The additional

poundage quickly and permanently flattens the spring arch, resulting in rough riding and sometimes in actual damage to the car.

Insulation has brought a new degree of comfort and cleanliness to the home on wheels. The latest models are completely insulated, even the floor, wheel-housings and roof ventilator. The insulation supplements an air space between interior paneling and exterior walls. Spun-glass wool, in the form of a continuous blanket backed by a layer of waterproof paper, is used by some builders, being placed in the sidewalls and roof. There is also a half-inch layer of insulation in the floor, a heavy layer of felt over the wheel-housings and a half-inch layer of insulation under the tops of roof ventilators. Thus, the trailer is

(Continued to page 128A)

"Anti-Stall Slots" Give Plane Better Control

Searching for a way to prevent wing tip stalls that make large transport ships hard to manage at slow flying speeds, Lockheed engineers recently cut permanent slots through the wing near the leading edge, and then put the plane through exhaustive trials. They found that the slots, besides completely eliminating wing tip stalls, permit positive lateral control well below the normal stalling point. The slots increase the speed of air across the wing surface, providing a steady flow at the trailing edge where the ailerons can act effectively against it. There is no reduction in cruising speed, but top speed is decreased two miles per hour by the slots. They do not interfere with de-icing boots.



Top, tufts of yarn used during test indicate air farther out is flowing toward leading edge as plane stalls. Below, wing with anti-stall slots

Motor-Driven Lawn Roller Works on Level or Inclines



Demonstrating how power roller may be used in maintaining lawns on sloping ground. The machine rolls one acre per hour

Motor-driven and easily operated by one man, a lawn rolling machine designed by a Connecticut man reduces the cost of maintaining large grass-covered areas. The machine weighs a ton, but is unusually flexible in operation, lending itself to such uses as rolling the lawn on inclines. An acre of lawn per hour can be rolled with the machine.

¶The German government radio station at Herzberg, Saxony, has a mast 1,111 feet high, reputed to be the tallest structure in Europe.

Designed by H. W. Sayley, Danbury, Conn.

Chicago Tribune

"Blister" on Camouflaged Plane Houses Gun



Here is a camouflaged warplane in flight during a 25,000-mile demonstration tour of Central and South American countries. Note the "blister" housing the machine gun amidships

Camouflaged to blend with the colors of mountainous terrain, a Lockheed military plane recently made a 25,000-mile demonstration tour of Central and South Ameri-

can countries. A "blister" in the top of the fuselage, near the center, protects a machine gunner as he sits behind the weapon and provides visibility in all directions.

Big Boat Motor Mounted Aft Lessens Noise and Fumes

Mounted at the stern as on smaller outboard motorboats, an engine available for boat owners delivers twenty-eight to thirty-three horsepower. The aft position

lessens noise and prevents oil fumes and exhaust gases from reaching the passengers. Steering and other controls are handled from inside the boat.



Controlled from inside boat, this big motor is installed at stern of boat to reduce noise and fumes

Old Violins "Speak" Better Than New Instruments

Studies show that an old violin of excellent quality will vibrate or "speak" when held in the outstretched hand, if one speaks to it from an appreciable distance, Dr. Frederick A. Saunders of Harvard University reports. An old instrument, such as the Stradivarius and Guarnerius, picks up enough energy from the sound waves to vibrate. This means, Dr. Saunders says, that the player, when doing a very rapid passage, may just succeed in making an old violin speak properly through the whole of it, while a slight balkiness of a new violin might prevent him from getting through it successfully. Modern instruments do not speak as easily as old violins, the studies showed. Seeking a

cause for this, Dr. Saunders is making tests to check the hypothesis that old violins are lighter than new ones, possibly because some of the constituents of the wood may have evaporated with time or because vibration has broken down some of the cell walls in the top plate of the violin so that the wood has become more flexible than when it was new. When the real changes are determined, Dr. Saunders says, it may be possible for science to age wood artificially to get the best effects from a new instrument.

Hedge Trimmer Works Like Pump Gun

Operated like a pump gun to speed up work, a new hedge trimmer enables the user to trim faster with less effort and fatigue than when ordinary shears are employed. The cutting bar has nine stationary teeth and four moving blades, staggered so only one blade is cutting at a time, making it easy to clip the toughest hedge. The trimmer is particularly recommended for shaping and decorative work.



Cutting the shrubbery with the aid of hedge trimmer operated like a pump-action gun

Seven-Screw Unsinkable Ship Hits Eighty-Mile Clip at Sea

Designer, M. L. Culbert



Cost about \$70,000. Sea. Hydro



Two views of seven-motored "Nassau Clipper," unsinkable ship which skims surface at top speed and is designed to make eighty miles an hour

There was launched at Brunswick, Ga., recently an "unsinkable" ship whose seven propellers, turned by seven engines of a total of 2,150 horsepower, are expected to drive it on ocean waters at eighty miles an hour. At rest, this unusual vessel draws twelve feet of water, but once under

way it rises to skim swiftly above the surface. Eighty feet long and twenty-two feet wide, it has two decks accommodating more than 200 passengers or a 300-ton freight cargo. The hull is one-fourth steel, three-fourths Dow metal, and the upper deck is covered with a streamline housing. On each side of the shallow keel the boat has concave undersides. The builder has contracted to construct a similar 200-foot ship with a speed of eighty miles an hour to haul fruit, vegetables and passengers between Texas, Florida and New York.

Clyde Cutlery Co.

Mail-Order Co., Holland, Mich.

2027
63 W. Jackson Blvd
Chicago

How to GET



Adjustments on the modern engine are so critical that only the most up-to-the-minute equipment (circle) can be depended upon to make them. Left, engine with small pistons produces more power than one with large ones

IF YOU want more gasoline mileage or at least the maximum you can expect from an efficiency standpoint, the problem generally must be looked at from the standpoint of the fuel used, the mechanical condition of the engine and automobile, and the way the car is driven.

First, gasoline is important. Modern engines give their best performance on premium fuels, so, if a motorist uses cheap

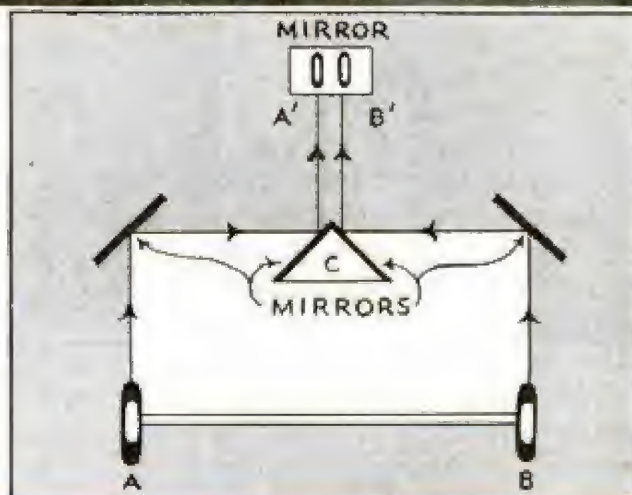
fuel or even some of the regular grades his engine must be tuned down to those fuels rather than up to the performance possible with premium fuels. The slight extra cost of premium fuels is offset in most cases by much better engine operation and greater intervals between service operations.

Volatility has much to do with general engine performance and to better understand it let it be assumed that commercial

MORE MILEAGE



Wheel tester permits car owner to see if anything is wrong (above). Right, sketch of how tester works. Bottom, what car owner sees in small mirror on machine. Wheels at left are obviously out of alinement; those at right have been corrected. Note how images of front wheels are drawn together by the mirrors

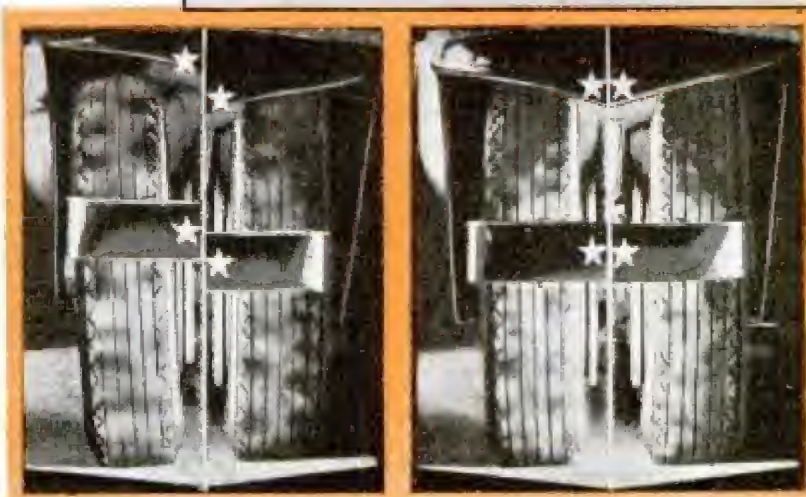


gasolines are made up of three parts called, light, medium and heavy fractions.

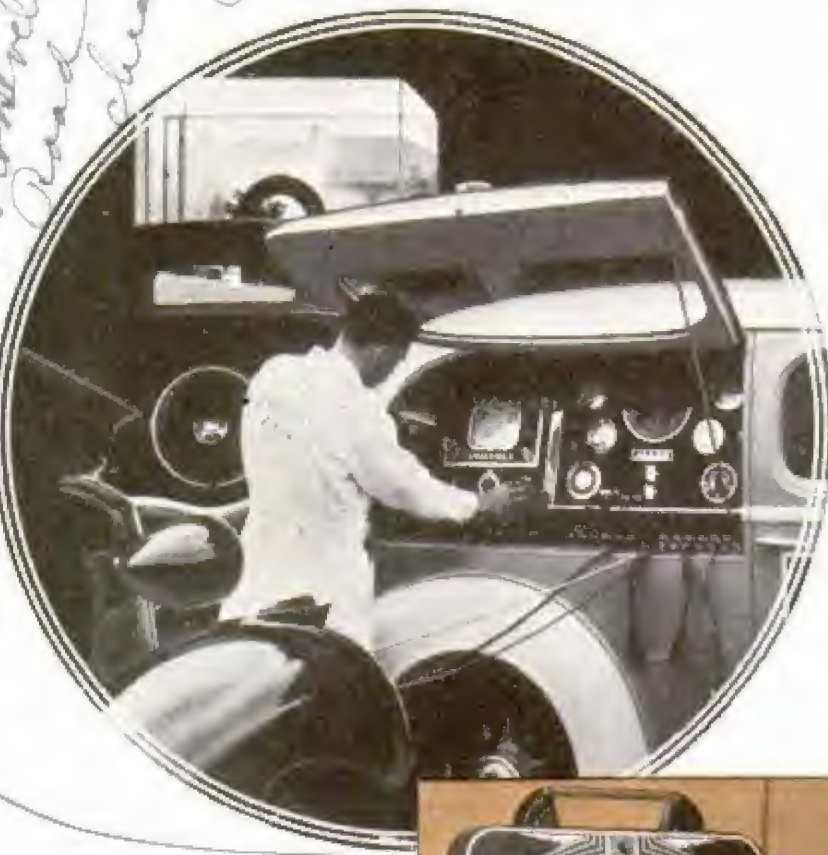
Different liquids vaporize at different temperatures. Water, for instance, vaporizes at 212 degrees. Likewise, light fractions of gasoline completely vaporize at temperatures up to about 180 degrees, the medium fractions from this point up to about 250 degrees and the heavy fractions above 250 degrees.

Gasoline containing too great a percentage of light fractions vaporizes rapidly through the fuel tank vent and the carburetor. This causes poor mileage. In addition, too high a percentage of light fractions may cause bubbles in the fuel lines, called "vapor lock."

If the heavy fractions predominate, the engine will start



*Joseph Weidenhoff drove
4344 w. Roosevelt
Road
Chicago*



hard and it will take longer for the engine to warm up. There also may be excessive dilution of the crankcase oil.

It is important to use fresh gasoline if you want more mileage. Gasoline which has been confined in an unsealed container for any length of time is apt to have high gum content. There is a small amount of dissolved gum in all gasoline which does no harm, but if there is too much gum content it will not vaporize in the engine along with the gasoline but forms a sticky deposit in the carburetor, intake manifold, or on the intake valve stems and such parts. This sticky substance, absorbing oxygen out of the air, gradually hardens like varnish, usually causing considerable trouble.

Present-day cars have engines designed to give their maximum gasoline performance and mileage on fuels of high octane rating.

Octane is an indication of the anti-knock value of a given fuel expressed by an arbitrary numbering system. In the laboratory specimen fuels are tested for octane value by checking their "pinging" or knocking

tendencies against mixtures of iso-octane and normal heptane. Iso-octane is a liquid having the highest known anti-knock value, normal heptane, the lowest value. The percentage of iso-octane to normal heptane that produces a knock or ping equivalent to the fuel being tested is called the octane number of the fuel. For example, seventy parts of iso-octane and thirty parts of heptane indicate an anti-knock value of seventy per cent.

The rise in compression pressures of modern engines has had much to do with the need for anti-knock fuels.

Some fifteen years ago the average compression ratio of engines was about four to one, while today it is over six to one, with indications that it may go higher. As compression ratios of engines were in-



Top, locating trouble with modern tune-up equipment. Center, instrument for attaching to ignition distributor aids in tuning engine. Bottom, testing vacuum advance of distributor

creased the engines were prone to "knock."

Automotive engineers some years ago studied what goes on in the combustion chamber of an engine when it operates under all kinds of conditions. It was found that the flame of combustion starts at the spark plug and travels at a uniform speed from this point across the combustion chamber. There is a gradual increase in pressure and then suddenly a new flame starts up opposite the spark plug. The two flames move toward each other with great rapidity and the gasoline burns so fast that it is like an explosion. This results in a very high pressure developed at a terrific rate. The pressure rises so fast that it takes place while the piston is still on its upward compression stroke or at top dead center. The piston cannot use the great pressure thus developed and receives a hammer-like blow instead of a powerful push. The result is a sharp metallic-like knock which is transmitted to the piston pin, connecting rod and engine bearings. Blown gaskets, split piston heads and broken spark-plug porcelains often result.

When this knocking takes place the energy from the burning gasoline is developed so fast that the pistons cannot use it to advantage and much of the energy is lost to the cooling water, causing overheating and a general waste of power. An engine that knocks or pings always wastes power and this means fuel waste.

In order to get an even burning gasoline many experiments were performed and it was found that by adding tetraethyl lead to the fuel the knock could be eliminated completely. Naturally the tighter the air-gasoline mixture is compressed before the spark takes place to ignite the charge, the greater the power developed. Ordinary gasoline, however, explodes too soon if it is compressed beyond a certain limit. Adding tetraethyl fluid to the gasoline allows of higher compression without knocking.

From the standpoint of the mechanical condition of the engine three things must be considered in getting maximum fuel mileage—compression, ignition and carburetion. No amount of adjustment in either ignition or carburetion, or both, will have a marked effect on gasoline mileage and good performance generally, if the engine compression is low. The higher com-

(Continued to page 138A)

Eyeshade Worn Like Specs Cuts Glare from All Sides



Cuplike shades reduce glare from sky or indoor light

Excessive eyestrain suffered while reading is greatly reduced by an eyeshade consisting of two cups fitting over the eyes like glasses. Designed primarily for students, the shade works on the same principle as a lens shade for cameras.

Twin Lamps in Telephone Base Light Dial for Night Calls

Two lights set in a special base for the telephone give plenty of illumination from both sides of the dial for night operation. Since the bulbs require little current, the lamp can be used as a night light.



Night lights on phone end fumbling in dark for dial

Slot Machine Weighs Letter Then Stamps and Mails It



Slot-machine post office weighs letter, then stamps it and deposits it when proper coins are inserted

An automatic post office in itself, a coin machine being tried out in the New York general post office tells you how much postage your letter requires, then stamps and mails it for you. You slip the letter in a slot, turn a knob and instantly the letter is weighed and the required postage is shown on a dial. Next you insert the proper coins in slots at the top, drop your letter in the mailing slot and the postage paid is printed on the envelope, which then falls into a box. Since it does not require cancellation, the letter is speedily on its way.

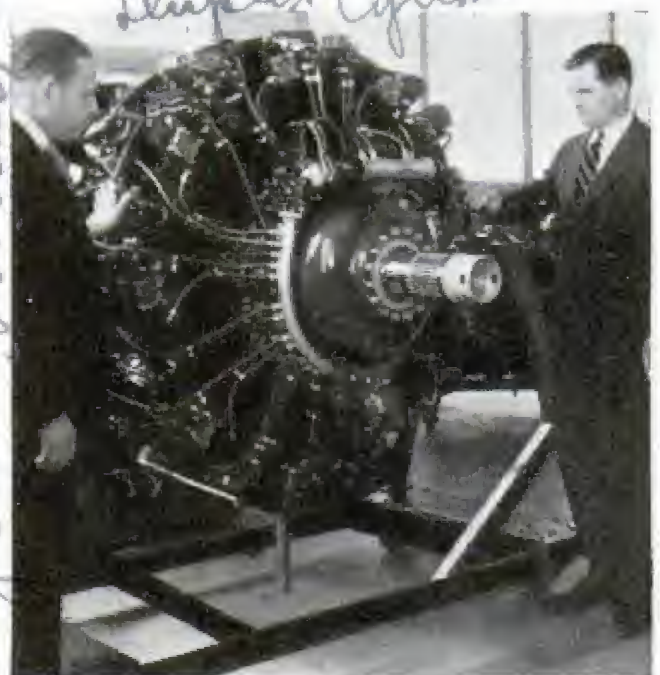
Oxygen Mask for Use at Home Reduces Cost of Treatment

Administration of oxygen to patients at an economical cost is the promise of a new

type oxygen mask which already has been installed on air-transport planes for high-altitude use. The mask can be used in the patient's home as well as in hospitals, and makes unnecessary the large oxygen tent which costs from twelve to twenty-five dollars a day. Because of the efficiency of the mask, it also can be used to give helium and oxygen inexpensively for the relief of asthma. One patient desperately ill with rheumatic heart disease improved immediately when treated with oxygen with the mask, which, not a cure itself, bolstered the patient's recuperative power.

"Twin-Nine" Aircraft Engines Power Giant Flying Boat

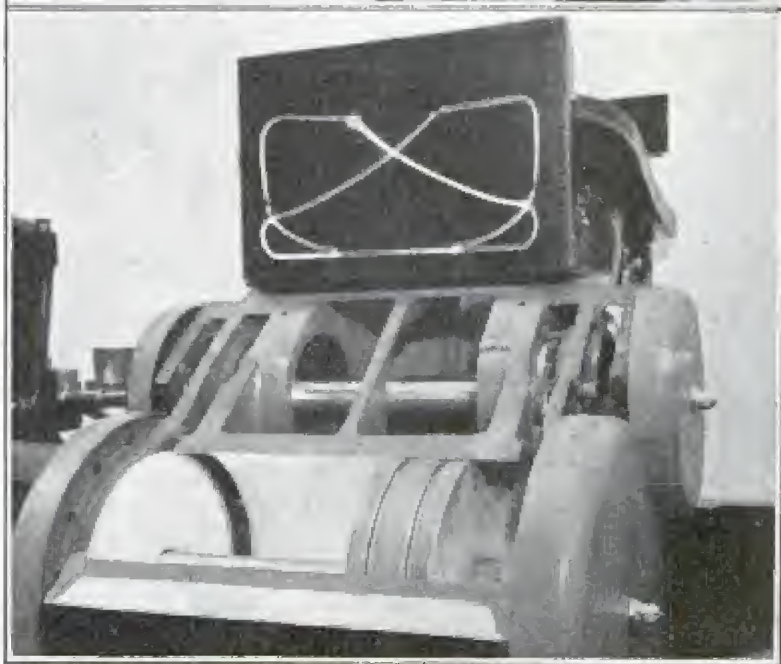
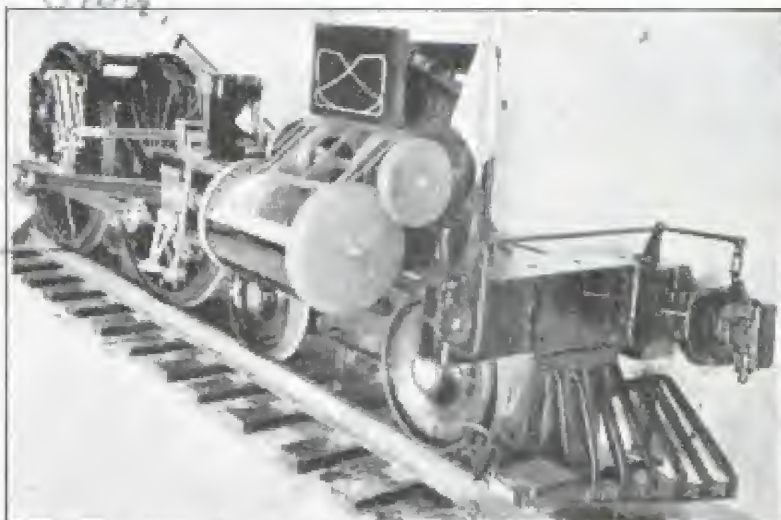
Tops in air-cooled aircraft engines is the eighteen-cylinder, 2,000-horsepower motor just completed by the Wright Aeronautical Corporation with the aid of army air corps engineers. Virtually two nine-cylinder engines built on a single crankcase and using a common crankshaft, it is a double-row, radial type and develops 500 more horsepower than the fourteen-cylinder Wright Cyclone which was its forerunner, and which had the highest power rating previously given an American air-cooled radial motor. Two of the new engines form the power plant of the new Consolidated flying boat which made its baptismal flight recently with fifty-two passengers and a crew of five.



Most powerful air-cooled airplane motor built in America is this eighteen-cylinder engine

'X-Ray' Locomotive Shows What Makes It Go

Shopmen of the Chicago and Eastern Illinois railroad sliced up a locomotive to show the public what makes the wheels go 'round. At the touch of a button, a guide in Chicago's Rosenwald Museum of Science and Industry starts the big drive wheels turning and you see the piston moving slowly back and forth in the cut-away cylinder, and above it the action of the valve that alternately feeds and exhausts steam. Colored lights inside the "phantom" cylinder change to represent the phases of intake, expansion and exhaust, and corresponding lights in a diagram above the exhibit help to explain the operation.

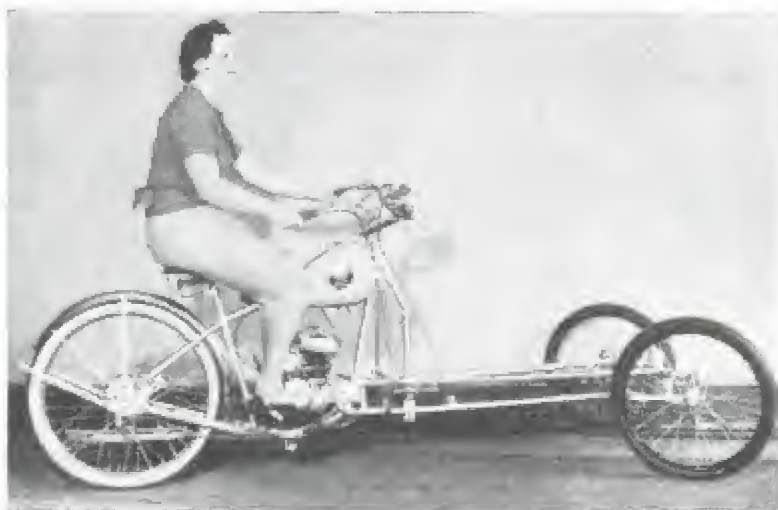


"Phantom" locomotive and closeup of cylinder as piston moves forward, steam entering at left and exhausting from head end

Trick Mirrors Show How You'd Look in Glasses

You can choose eye glasses to match your personality and profile without even trying them on. It's done with mirrors. You gaze into a box-like arrangement of semi-transparent mirrors at the New York Museum of Science and Industry and see yourself in a pair of Chinese spectacles. Turn a knob and a set of modern glasses appears on your face. All the latest styles are shown in turn.

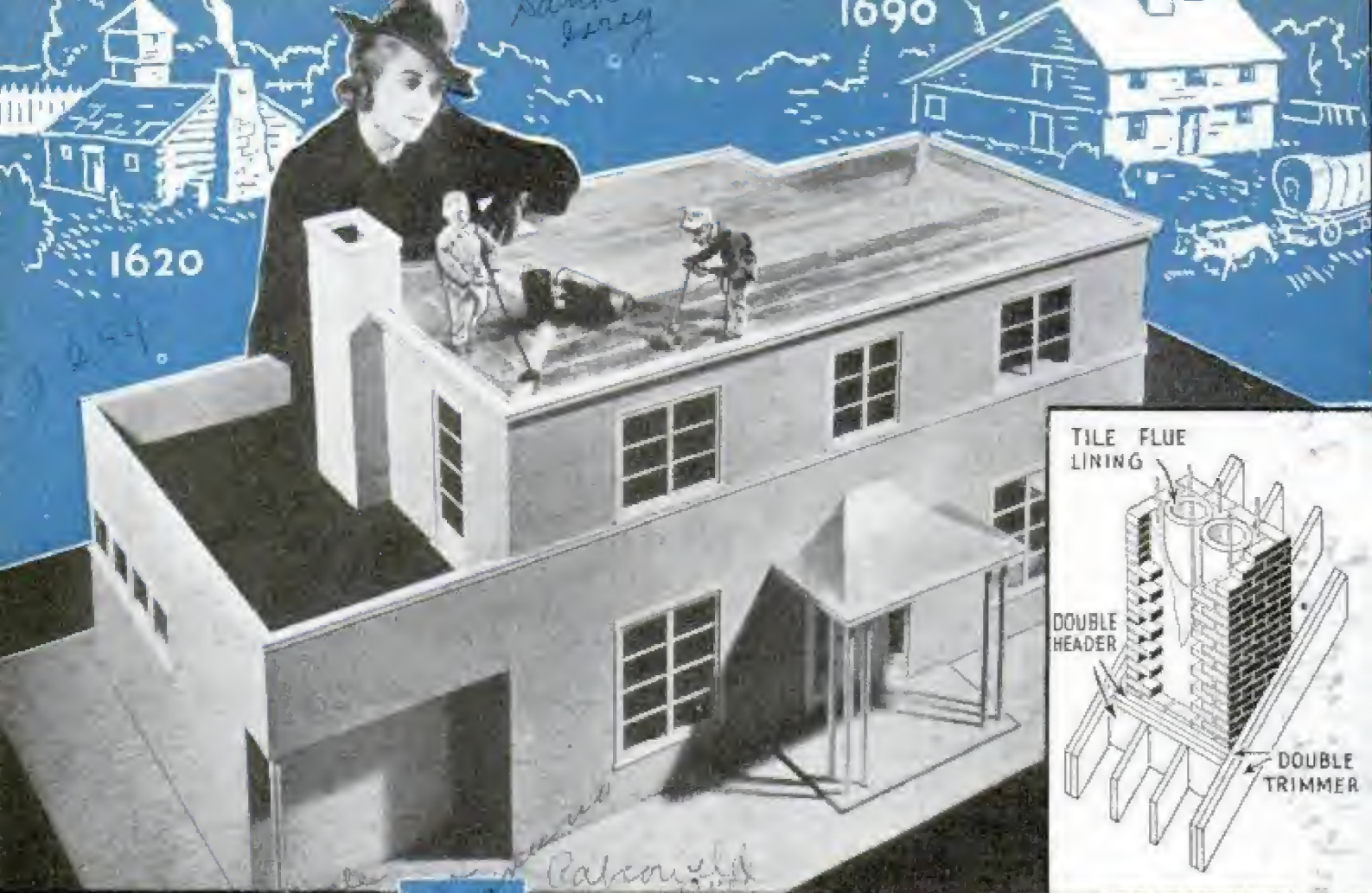
Motor Bike Adds Third Wheel for Package Deliveries



With two wheels installed in place of single front wheel, this motor tricycle can carry large box of parcels for delivery

During business hours it's a tricycle in reverse. For pleasure riding, it becomes a motor bicycle. Invented by a Milwaukeean, the vehicle is a combination affair; when used for delivery of parcels, a box is fastened to the open section in front of the tricycle, and it is steered by two front wheels. These wheels and the frame are easily removed to install a single front wheel matching the rear. The motor weighs twenty-three pounds, burns fuel oil and gasoline and drives the bike 100 to 140 miles on one gallon.

Clw. Carl Dolan 55897



MONEY SAVERS



Photo at top courtesy Pabco Press

Miniature model home (top), recommended chimney design (inset) and light plywood wall panel with strengthening members (bottom)

IF YOU are one of the several hundred thousand who are building a new home this year you can count on getting much more for your money than you would have ten or fifteen years ago. The trend is toward lower-priced houses, partly because it doesn't cost so much to obtain many of the conveniences that were expensive in the past.

Such things as indirect lighting and stainless-steel working surfaces in the kitchen, a stall shower as well as a tub, wardrobes with sliding doors, Venetian blinds, overhead garage doors with finger-tip control, and electrically operated gas or oil heating furnaces are moderately priced today. Heat insulation is less expensive and air-conditioning costs are coming down.

Simplified architecture that avoids excessive ornamentation on one hand and the stark severity of modernistic lines on the other is the trend. Bright patches of color on the exterior are becoming popular and your house may have a colored door or possibly a white

10555 Hollywood Ave
Los Angeles 254



for the HOME BUILDER



Los Angeles.

Erecting sections of prefabricated plywood house (top) and inexpensive modern home, which is better lighted and contains more conveniences than older houses that cost more to build (bottom)

or blue roof. A light color instead of a dark one on the roof helps keep out summer heat. A good way to lighten up a dark hallway is to use a skylight, filtering the light through a pane of orange glass.

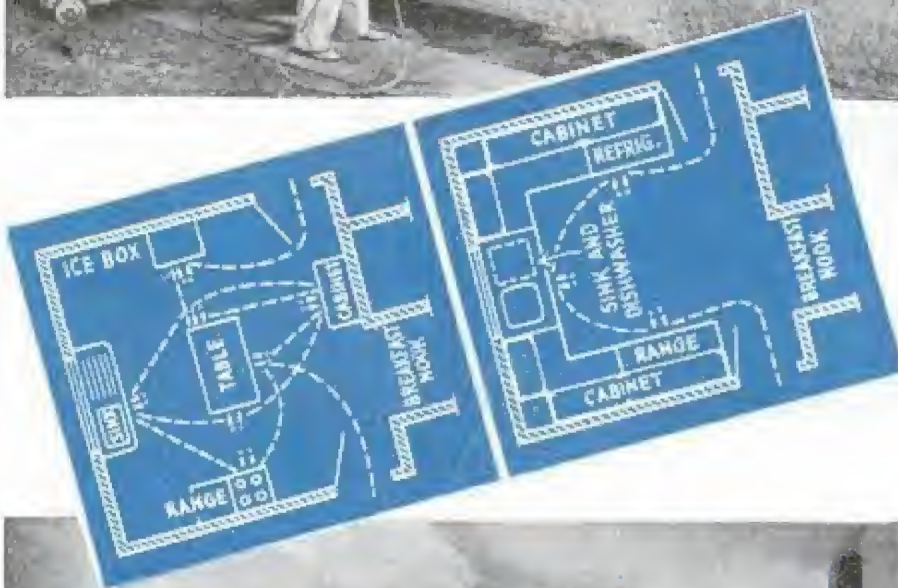
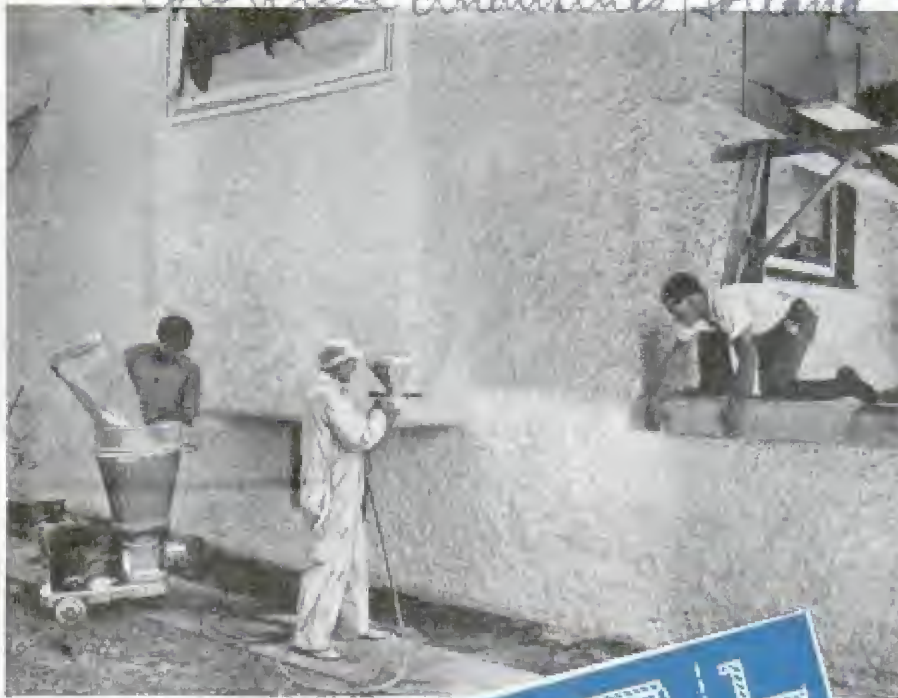
Building materials are not cheap but you will get your money's worth because many materials have been improved for greater permanence. New paints and composition roof materials resist the elements better than ever because asphalt, asbestos,

Ryer Systems, 3305 Wilshire Blvd Los Angeles

and other permanent materials are built into them. The market contains wide varieties of new fabricated materials, and contractors have learned new ways of using old materials. Lightweight concrete mixtures that are warm to the feet are used in place of flooring in some homes.

There are many things that you can do to cut down building costs without sacrificing quality. As a rule frame or frame-and-stucco buildings are the least expen-

Colorado Industries / Holland Press



sive. A local contractor or a building-supply house is the best source of advice because material and labor prices vary in different parts of the country. A new home should meet the minimum construction specifications of the Federal Housing Administration as a guarantee of sturdy construction.

Generally speaking, the cost of a home should be about two or two and a half times your annual salary. A good rule of thumb is that eighty per cent of the total investment should be in the house with the balance representing the cost of the ground.

There are five basic suggestions for building a bargain home. A square or rectangular shape is the least expensive to build. All unnecessary corners both inside and out should be avoided. Roof lines should be as simple as possible with no complicated construction. Space devoted to hallways should be held to a minimum. The house should be designed to make full use of stock sizes and standard lengths in structural materials, and stock doors, window



Resurfacing old stucco building (top); comparison of old and new kitchen designs (center), showing how modern arrangement saves steps for housewife, and interior of inexpensive modern home (bottom)

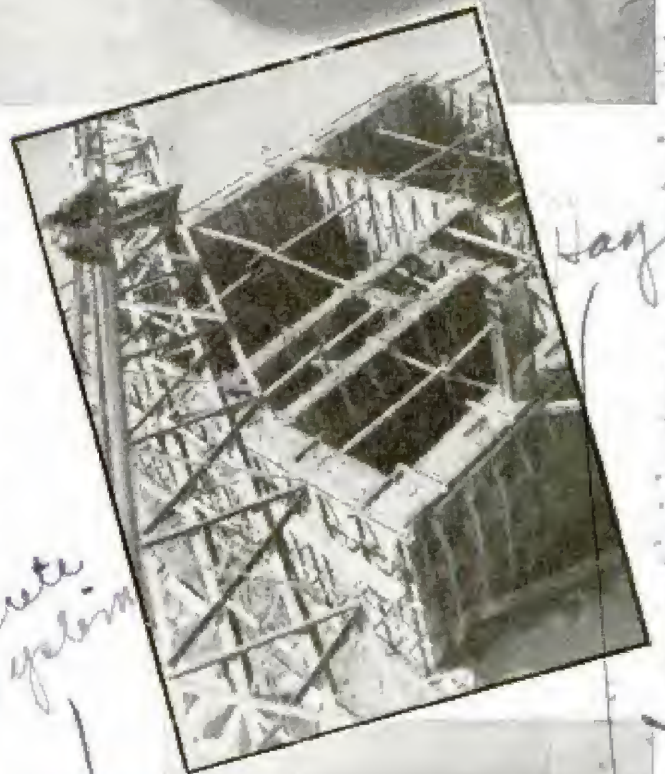


sash, and other stock items should be used.

Reducing the amount of space wasted in hallways is a part of modern design as well as a way to save. Also modern and less expensive is the use of a large living room with a secluded dining alcove opening from it instead of two smaller separate rooms.

The basement can be eliminated by using one of the new types of gas floor furnaces. Such heaters have their own chimneys and circulate only fresh clean air into the rooms. If extra storage space is needed it is cheaper to provide for it in a larger garage than in the basement. Foundations for a permanent home need to be concrete. On sloping sites the foundation should be protected by installing drainage tile to divert water away.

In wall construction, grouping the win-



Attaching sound-absorbent material to studs (top, right); bird's-eye view of concrete forms for low-cost house (center); box-room form suspended in air (bottom, left) and sheathing ceiling with sound-absorbent material

Hayes Econo-Crete System
1939
Hayes Econo-Crete Homes, Inc.



under the roof. Ventilation should allow circulation of air under the roof in the summer time to reduce the heat load. There are numerous insulating materials, flexible mats, sheets, panels, and aluminum foil. It is cheaper to insulate a home at the time of construction than later, and adequate weatherstripping, close-fitting doors, and other details help keep a home warmer in winter and cooler in summer. A well-insulated house stays ten degrees cooler in the summer.

In arranging for a fireplace, it should not be located near an entrance door or where cross drafts sweep past it. A shallow fireplace throws out the most heat. Scientifically designed metal forms

that insure perfect draft are on the market and some of these contain air-heating and circulating chambers that materially increase the amount of heat that a fireplace radiates into the room. In chimney construction a saving can be made by using flue lining surrounded by only one thickness of brick or other masonry, the space between



dows in large areas rather than in small scattered units is recommended. Corner windows follow the modern trend and allow more usable wall space for placing furniture. To reduce waste, rooms should be designed to use framing lumber only slightly under standard lengths. Tongue-grooved subfloors two inches thick laid directly on steel girders properly spaced are cheaper than thinner subfloors supported by many joists.

Flat roofs require the least amount of materials. A low-pitched roof has less area and hence costs less than a high-pitched roof. The roof is the weakest part of the house in admitting or releasing heat and the best place for insulation is probably under the attic floor, sealing the rooms below from the space



Fireplace heater (top); low-cost concrete house under construction (center) and living room of modern two-story house (bottom). Note free-hanging staircase in background

the lining and the brick being filled with cement mortar and containing reinforcing rods extending the full height.

The dimensions of kitchens and bathrooms should be planned with the size of the tile to be used in mind, as a change of a few inches may eliminate patching.

Another subject that it pays to study ahead of time is that of the finish for interior walls and ceilings. Plaster, wood, wallboard, plywood, and a host of other materials are available. Wearing quality and upkeep should be considered as well as appearance.

Cost reduction in plumbing can be obtained by grouping all plumbing fixtures close together.

Careful planning of switches and outlets helps cut the cost of the electric installation although it is better to have too many than too few outlets.

The life of a building depends to a large extent on the condition of the structure under the floor and inside the walls. That means that adequate ventilation under the floor is important to reduce moisture. Ventilating openings on opposite sides of the house, near the corners, permit air to circulate and keep the structure dry.

Watching costs in home building makes important savings possible but many owners are apt to be dissatisfied later if they cut costs too closely. For many years the construction industry has been doing its best to build satisfactory homes at less expense, and for a long time builders have been pinning their hopes on some sort of prefabricated home that they could merchandise.

One of the latest ideas in "packaged" homes is to use plastic and plywood panels of standard sizes. Such panels, completely waterproof, are satisfactory for either exterior walls or interior partitions. In one type of construction such a wall consists of

(Continued to page 125A)

Receiver Dressed in Glass Shows Secrets of Television



Phantom-like television set gives public close-up view of mysterious parts that the owner would never see in his receiver

Some of the secrets of television reception are disclosed to the public by a glass-encased receiver exhibited by RCA at the New York World's Fair. Although it is not in operation, those who see the set gain an impression of the genius out of which grew such an involved and intricate piece of magic in this newer field of radio.

Daylight Loader for Bulk Film Feeds Miniature Camera

Miniature camera owners using the inexpensive bulk film can load it with a daylight film tank just put on the market. Ordinarily bulk film would have to be loaded in the darkroom, but this daylight loader holds 300 feet of thirty-five-millimeter film. The magazine to be loaded is placed in a special chamber in the tank, and the film is fed into it through a light trap. A hand crank winds the film. Outside the tank are two counters, one showing the amount of film remaining in the tank, the other the amount of film being loaded into the magazine.



E. Leitz, Inc., 730.5th

Cont. James W. Greeng, 431 W. 68th Terrace, Kansas City, Mo.

2915 N. Western Ave. Chicago

Blazing NEW TRAILS



Alec Templeton, blind pianist, trying out the Novachord. Below, electric organ, occupying small space in the home, is capable of producing 253 million different shades of tone



MUSIC is an art, the making of instruments a science. That may explain, in some measure, how Laurens Hammond has been able to invent the electric organ and the Novachord, even though he cannot play a piano.

By inclination and training, the unmusical Mr. Hammond is an inventor. On his desk is a large binder full of patents that have been issued to him. The first one, dated 1912, is for a barometer he developed when he was but sixteen years old. His earlier efforts were in connection with Diesel engines, three dimensional pictures, and novel stage-lighting effects, but the turning point in his career was his synchronous motor. He used it as the heart of the first electric clocks he made in a small room over a store building in Evanston, Ill., and almost overnight there was a national clamor for them. The shop mushroomed into a large plant.

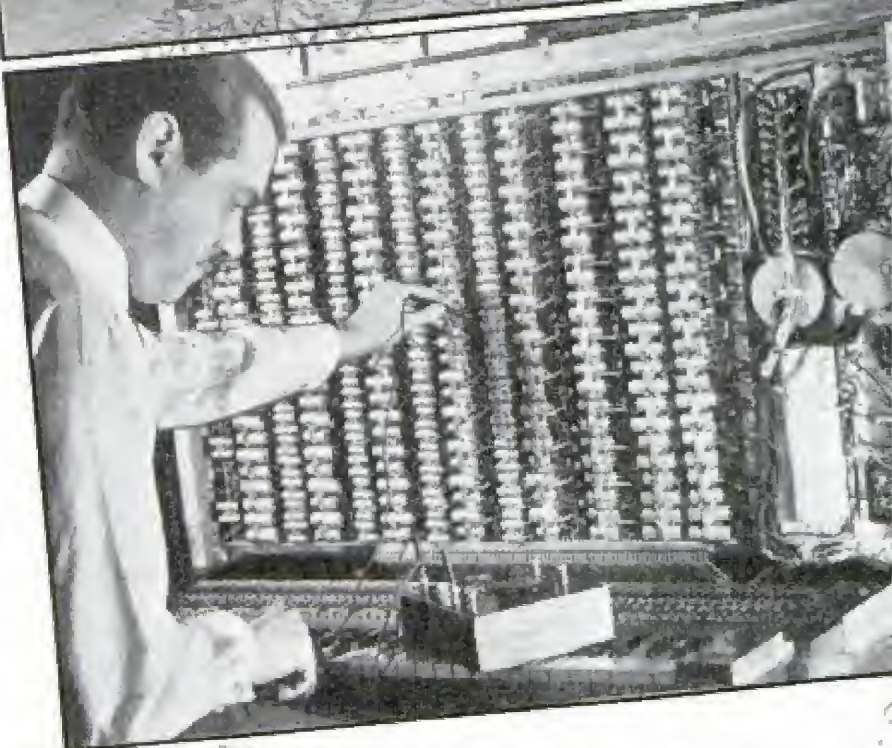
Hammond started looking around for



other fields in which his delicate mechanism might be put to work. A combination clock and calendar was his first adaptation and this he followed with a synchronous phonograph motor, and finally the electric playing-card shuffler.

But Hammond's main inventive dish—the electric organ—called not for a Bach or even a Leopold Stokowski, as you might

for MUSIC



suppose, but an infinitely patient engineer with a thorough grounding in the laws of sound.

Didn't music depend on physics? If one tone could be produced with electrical impulses, as was the case with the dial signal on the automatic telephone, why couldn't other tones of the scale?

The inventor proceeded to work out a practicable way of producing, varying, and swelling sounds electrically. Ninety-one alternating-current generators of the electric-clock type, each operating at a different frequency, were rigged up to a synchronous motor. Thus, at the touch of a key, electrical vibrations would generate the sound, which could be amplified to any de-

Top, Inventor Hammond checking a frequency response curve. Center, orchestra made up of electrically controlled instruments, string bass, violin, Spanish guitar and the Novachord. Bottom, instrument used in checking tones of the Novachord

Tom Adrian Craycraft 201



Tones of the Novachord (above) are produced by circuits of ordinary vacuum tubes. A new non-electric instrument (right), a cello-horn. Bottom, another new instrument, the vibra-harp, has the sound of a harp-but is played like a piano

sired volume. The ninety-one tone wheels, Hammond found, were capable of producing approximately 253 million shades of tone.

Musicians were impressed. Here was a new sound-producing agency, the first important one to come along in several thousand years. What was more, the sound source was vibrated in a manner never before attempted, a way that made possible the absolute control of the physical qualities of each tone.

Composers and concert artists who normally sniff at scientific music applauded the electric organ. George Gershwin bought the first one, other musical headliners followed.

For the price of a grand piano, churches unable to buy pipe organs found a substitute in this compact instrument that used about ten dollars worth of current



a year and never got out of tune. Home organ music, once a luxury, began to be heard in small homes. Within a few months, more than 800 organs were sold.

Two years ago Hammond, after seeing his electric organ carried to more than forty foreign countries, went to work on a second electric instrument, the Novachord, the successful development of which has given the musical world food for conversation and speculation the last few months.

Contrary to popular belief, the talented offspring of the electric organ is not designed to imitate any regular instrument and according to Hammond, its full potentialities are not manifest in the familiar melodies now being played on it. But until music in line with its versatility is written for it, the instrument, which might be mistaken for an old-fashioned spinet at first glance, must remain a musical mimic. Played in

Deagan, Inc. 1770 Berteau Ave Chicago

Miss Hammett Anderson

Miss Dorothy Crocker

the manner of a piano, it yields not only piano and harpsichord tones but simulates the effects of the violin, cello, French horn, Hawaiian steel guitar. But in place of pipes, reeds, strings, hammers or vibrating parts, it has circuits of ordinary vacuum tubes.

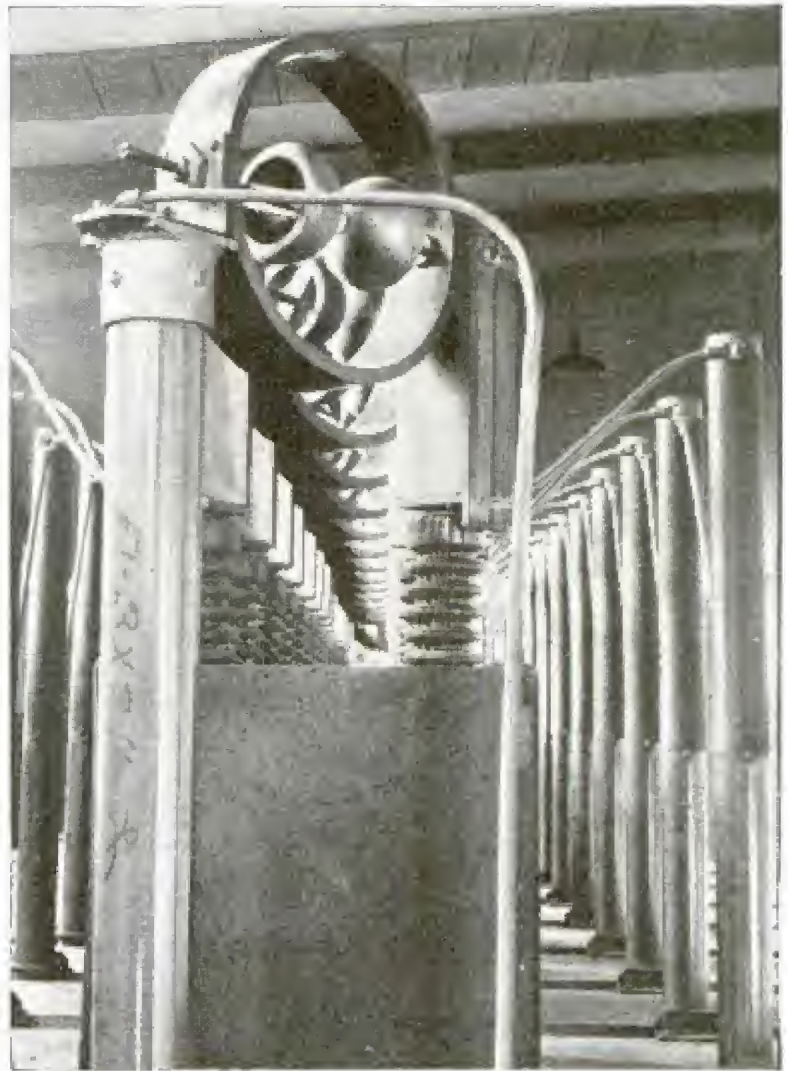
From the viewpoint of an engineer, Hammond feels the development of musical instruments should lie in the direction of making them more flexible and versatile so that composers and musicians will have new tools permitting them greater freedom in the expression of their art.

"An artist," he points out, "who is going to paint a picture buys a canvas and a box of pure color paints. The canvas has no lines on it and he mixes every shade of color himself. What he paints is entirely his own doing. He would scorn any offer of mixed paints such as 'flesh pink' or 'sunset red.' The musician, on the other hand, has never been able to get musical instruments which have not been 'voiced' by the maker of the instrument. The builder in his shop has picked the 'nice tone' to put into the instrument, and the musician must be satisfied with it or by some other builder's fine tone. This is simply the 'flesh pink' idea in a different form, and for this reason the composer has never enjoyed the freedom of the painter.

"Naturally, too much freedom may not produce the best results immediately. An instrument which is flexible enough to allow the musician to explore new possibilities in beautiful tone colors, will also permit him to blunder into horrid noises. This, however, is the exact way in which art makes progress."

Already composers, young writers with fresh vision, are seeking to combine the resources of the past with the new music materials engineering science is making possible.

Man-Made "Hot" Lightning Is Now in Mass Production



Surge generator on test line at Westinghouse plant produces artificial lightning wave of 1,500,000 volts per microsecond

Until recently, artificial lightning was like the natural flash in everything except that it would not start fires. Cold lightning at three million volts would splinter a transmission line pole and dent a metal sheet, but never caused a blaze. Now Westinghouse engineers have developed "hot" lightning and put it in mass production. Bringing into play a low-current, long-duration discharge, they produced a lightning stroke that set fire to a haystack, fused sand, and burned through metal. "Cold" lightning fails to ignite targets because it lasts less than 100 millionths of a second. The low-current "hot" lightning lasts 100 to 1,000 times as long. The discharge is released through a series of coils in oil to slow up its rate of flow. With the apparatus at Sharon, Pa., Westinghouse produces 1,500,000 volts per microsecond, using it to test transformers.

☐ A London bus tire rolled 150,000 miles before it was retreaded and then went back into service.

Handwritten note: Claudia M. ...

Handwritten note: ...

Aurora Borealis Is Captured in a Neon-Filled Glass Tube



Luminous path of electrons in gas-filled tube is curved by magnet simulating creation of aurora borealis by magnetic pole

Scientists have captured the aurora borealis in a glass tube. Using a large glass bulb filled with neon gas, Dr. M. E. Bell of the Westinghouse Research Laboratories fired electrons into it with an electron "gun" similar to that used in television receiving tubes. The electrons bombarding the neon gas atoms left a luminous path in the bulb, and by turning a magnet in the upper side of the tube Dr. Bell was able to make the electron trail loop back on itself. The luminous curve illustrated the action of the earth as a giant magnet deflecting streams of electrons which emanate from the sun, producing the aurora borealis as they collide with gas molecules in the atmosphere high above the magnetic pole.

Iodine Needed for Plant Growth from Spinach to Yeast

After ten years of experiments, Prof. W. L. Rogers of Oregon State college believes that iodine is essential to the health and growth of plants from bacteria to spinach. Iodine seemed to be necessary

for chlorophyll formation and is highly concentrated in spinach and head lettuce, but even yeasts appeared to thrive better with a dose of iodine. The plants were grown in soilless cultures and one part of iodine in two to four million parts of water was sufficient. The professor thinks one advantage of using seaweed for fertilizer, a common practice on sea-coasts, is the addition of iodine to the soil.

Non-Skid Ladder for Auto Does Not Mar Finish

With vacuum cups to hold it firmly in place, a sturdy metal ladder supports the weight of a man cleaning or painting the top of an automobile. There is no danger of slipping, as the cups will not let go until released by lifting the rubber ring. Scratching or marking the car's surface is eliminated by using the rubber cups. The ladder is made in two sizes, three and one-half feet and five and one-half feet.



Rubber cups of strong ladder holding workman grip side of car and will not slip or mark car's finish

Corvallis, Oregon.

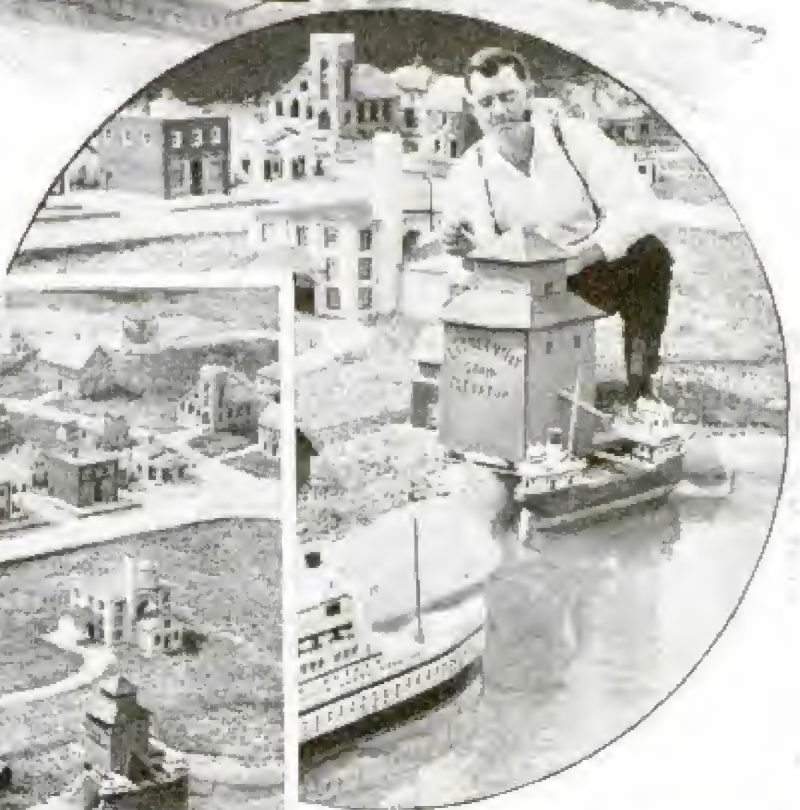
Philadelphia

'Littleville' Complete to Wired Model Houses



Above, visitors inspect "Littleville." Left, playing with a model vessel on the ship canal

"Littleville, Ind.," is a town in miniature built by William Murray. Traversed by a sidewalk for sightseers, it includes a smart business section, a residential section, a farm and a ship canal on which float model vessels. The houses are wired and the village may be converted into a brilliantly illuminated midget wonderland at night



Left, another view showing ship canal, grain elevator and a number of the buildings. Note the model train. Circle, closeup of grain elevator with ship in place for loading

Slotted Vacuum Nozzle for Venetian Blinds

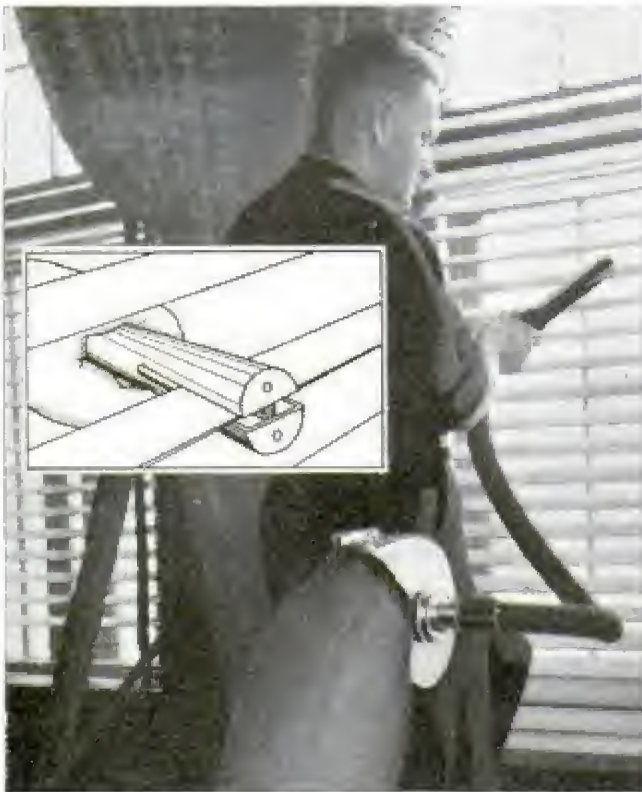


Photo and drawing show how slotted attachment for vacuum cleaner fits over slats of Venetian blinds

Venetian blinds can be vacuum-cleaned with an attachment specially designed for the purpose. The slotted nozzle cleans both sides of the slats at once.

Relief Maps Made for the Blind Are Lettered in Braille

Helping the blind gain clearer conceptions of the shapes of objects such as bridges, boats, and even maps, is the hobby of a businessman in Australia who fashions



Relief globe studied by two blind pupils and, right, European map with Braille tabs can be read by touch

miniatures in his home workshop which can be "read" with the fingers. Maps and globes which he produces in relief enable sightless people to learn the relative sizes and positions of the continents, countries and oceans; coastlines, rivers, mountains and towns are also in relief and can be identified by touch. In some maps toy ships, guided by metal grooves, indicate courses of trade routes. Names appearing on the charts are duplicated in Braille on small aluminum tabs. An index in Braille helps locate places indicated on the map. Models, likewise, contain Braille tabs properly placed giving the names of various sections or parts, and aid in imparting a knowledge of the shape and proportion of large structures like the Tower Bridge of London. The historical sailing ship "Santa Maria," representing another angle of the craftsman's work, has a hull of wood and sails of aluminum. Many of the maps and models have been presented to institutions for the blind in Australia.

Camera Worn Like Wrist Watch Loads Thirty-Six Pictures



Sighting the tiny "wrist-watch" camera which holds a thirty-six-frame film despite its size

Latest in the line of miniature cameras is a tiny affair worn like a wrist watch. Sighted easily by raising the wrist to eye level, it carries a load of thirty-six exposures despite its diminutive size. It has an f4.5 lens and a focusing scale graduating from one foot to infinity.

SNAP THEM

on the SLY



Pictures don't always need faces. That snapshot above tells a story of childish curiosity far better than any "head-on" studio portrait. The fireside silhouette is always a pleasing study; place a photo-flood bulb in the fireplace back of the subject



It's easy enough to make good snapshots of babies; it's when they grow up and become camera-conscious that trouble begins. Telling Bobby to "stand very still while I snap your picture" has ruined many a film. Either snap them on the sly and capture a natural playtime pose, or enlist the child as your assistant, keeping his attention focused on his play instead of himself



Tell Betty you want to photograph the biggest soap bubble she can blow, and she'll forget herself in her interest in producing a bubble for you. Put emphasis on the action, not the child. Playing with pets, building blocks, the telephone, piano, dolls—these activities make the youngsters forget camera

Marker for Fallen Seaplane Is Visible Ten Miles



Floating near an airplane down at sea this ball marker would be visible to rescuers ten miles away

Adding to safety of flying at sea, a chrome-plated ball has been developed to be carried by seaplanes to help summon aid in case of a forced landing or crash. The sphere's ninety-one facets reflect sunlight and flashlight rays for a distance of about ten miles, guiding searchers to the position of the luckless craft. If the wrecked ship submerges, the ball will remain afloat and can be used as a life preserver by survivors. The ball is carried in a special compartment atop the plane.

Your Voice in Reverse Sounds Like Foreign Language

If you'd talk to a wax disk and then play the record backwards, you'd never recognize your voice. Probably you'd take it for Choctaw or Chinese. The first impression of reversed speech is that of a foreign language spoken very rapidly. Even though you play the same word backwards, over

and over again, it is difficult to recognize it. Scientists are learning new things about the human voice and languages by reversing records. Many of the sounds you think you emit in speaking a sentence are actually omitted, elided or clipped.

Boat Rowed Facing Forward with Geared Oar Holders

Enabling boat users to face forward and see where they are going as they row in the conventional manner, a new device to which the oars are attached is mounted on each side of the boat. Reverse action of the oars is made possible by two combination gears in each oar holder. The usual rowing stroke is used, the oars moving forward by extending the arms and backward in the power stroke by drawing in the arms. The device consists of a bracket, which may be mounted on rowboat, canoe, skiff or dinghy, and a platform assembly of the two gears and shafts onto which the oar and oar handle are attached. When not in use, the oars may be folded at either side of the boat, or the platform assembly may be removed from the bracket by pulling



Top, oars folded. Note the gears. Bottom, oars in use with boatman facing forward

out a pin, permitting storage of the oars under the boat seats. In use the oars cannot fall out of the boat because the pin keeps the platform secured to the bracket. Use of the gearing results in greater leverage which increases power and speed in rowing. Other features include quiet operation, elimination of neck and shoulder strain and avoidance of obstacles in the boat's path.

9.571

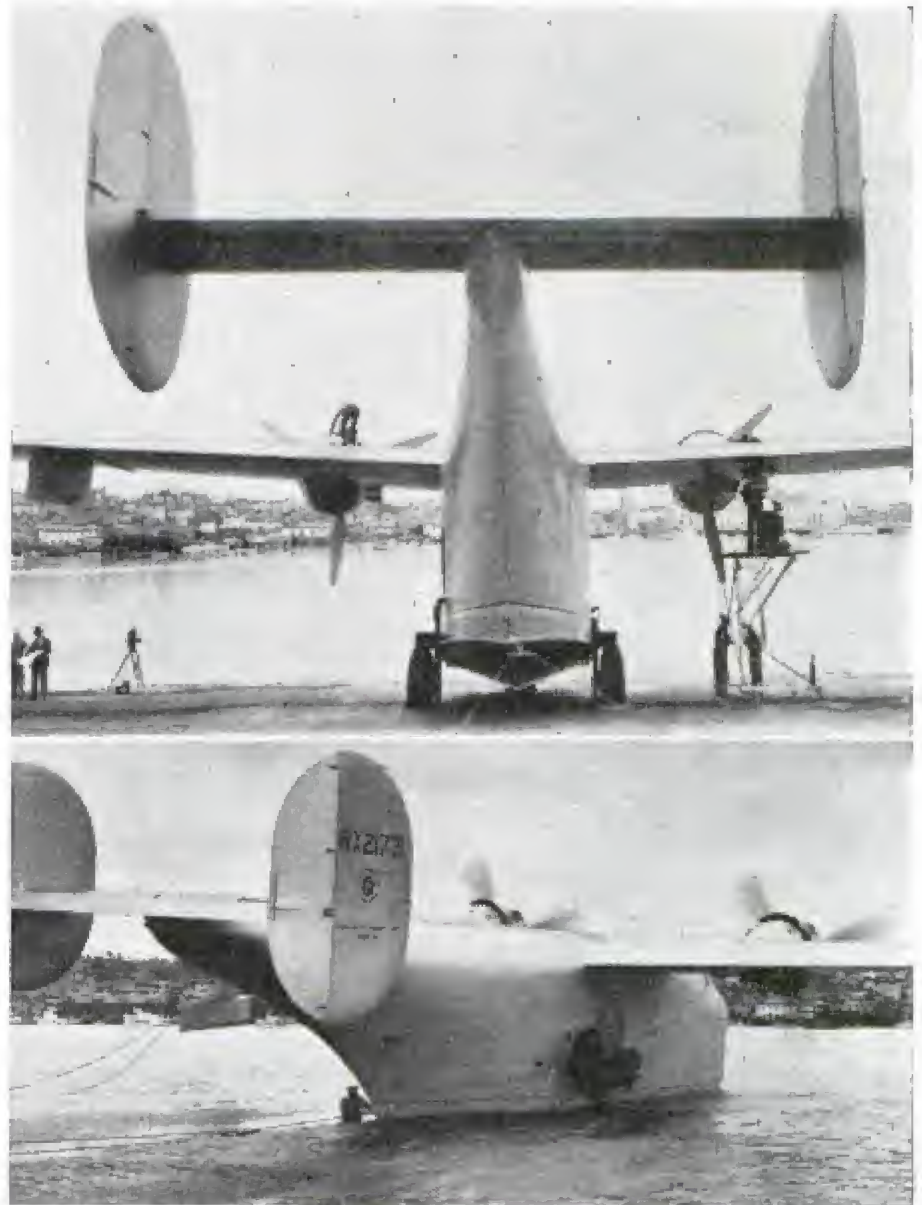
Headlamp on Jack Aids Repairs in Darkness

For operation at night, a handy jack for the serviceman has a built-in headlight. It is operated by a button on the handle grip and is powered by flashlight batteries, adapting it to use in repairs on the road, in dark garages and where strong lights overhead cast shadows under the automobile. The jack cannot be lowered while the mechanic is under the car because its release valve can be locked with a key which the mechanic puts in his pocket.



Headlamp enables repairman to place the jack properly under car in the dark

Super-Powered Flying Boat Boasts a 10,000-Mile Range



With relatively small wings for so vast a flying boat, this ship was lifted easily from the water by its two 2,000-horsepower air-cooled engines

Powered by two of the largest air-cooled motors ever developed for commercial aircraft, a flying boat that has just had its baptismal dip in San Diego bay boasts a top speed close to 300 miles an hour. Built by the Consolidated Aircraft Corporation, it seats fifty-two passengers and is converted into a sleeper plane at night with beds for twenty-eight. Seventy-three feet from prow to twin tail assembly, the big ship weighs twenty-five tons and is twenty-two feet high from keel to top of the engines. With its motors at their most economical cruising speed of 195 miles an hour the plane has a range of 10,000 miles.

Blackhawk Mfg Co

Milwaukee

*Bozzett. in blasting at
Michigan Falls*

25

*G. A. du Pont de Nemours & Co.
Wilmington, Del.*

DYNAMITE-

at Nashville, Tenn.



By Samuel Wesley Long

TRAPPED 500 feet down in a Michigan mine, forty-three men waited, almost hopelessly, in the darkness, wondering whether help could reach them in time.

On the other side of a formidable barrier of rock shaken from roof and walls of the shaft by the cave-in, rescuers fought to clear a path to the entombed miners. From several directions the crews advanced slowly—too slowly, it often seemed—as they broke down solid rock with dynamite and then cleared away the debris with shovels and even bare hands. Finally, just as the 130th hour ended, one rescue squad shattered the last wall—and



Ready to shoot (left), a blast that bears close resemblance to a forest (right) and ramming powder into face of coal mine (bottom)

their shout of triumph was echoed by a feeble cry of joy from the victims. All of the men were removed to safety, exhausted and broken by the ordeal but still alive.

*Rolls Cont. of
Marquette, Mich.*

the LIFE SAVER



Blasting on road control project (above) and (right) breaking up the ice on a frozen stream

That is only one of the many instances in which dynamite, popularly considered a destructive agency, has played the role of lifesaver, according to the U. S. Bureau of Mines. Back in 1936, while three men were examining an abandoned mine near Moose river, Nova Scotia, a cave-in cut off their escape to freedom. Volunteer crews, working in relays over a period of ten days and using dynamite freely, sunk a shaft to a depth of more than 100 feet. Several days before they could be taken





Left, setting blast charges at site of new dam. Below, blowing up a condemned factory building. Circle, view of Wyoming dam site just as blast was set off. Bottom, preparing charges for breaking lump coal off face of mine

Photo courtesy du Pont company



from the pit, the men were given a new lease on life by food lowered through a diamond drill hole. Then came the rescue of all three. One victim died as the result of long exposure in cold, damp surroundings, but the other two survived.

Today the boom of blasts is heard from one end of the country to the other as dynamite is called upon not only to save lives, but also to protect property.

Use of the explosive in this capacity began many decades ago. Hell Gate, a treacherous rocky pass lying in the East river,

New York, was the terror of shipping for years—until dynamite was employed to attack the menacing rocks. The daddy of all blasts to demolish Hell Gate was set off in



1885 when 288,936 pounds of dynamite sheared off Flood Rock well below the river's surface.

As early as 1875 dynamite was used to increase the depth of the rock-bound East river channel, a stretch of about sixteen miles of navigable water connecting Long Island Sound at Throgs Neck with the upper New York Bay.

Then dynamite—supplemented by steam shovels and dredges—slashed through the Isthmus of Panama. Gone was the long trip around Cape Horn and with it battling the elements at the extreme tip of South America. Nearly 61,000,000 pounds of dynamite were required in the digging of the big "ditch."

Safe harbors and deeper ones for vessels of ever-increasing draft dot the shore lines of our Atlantic and Pacific coasts, thanks to dynamite. Channels of rivers may be navigated safely because dynamite has added depth or removed the lurking danger of reefs ready to stave the stoutest ship's hull. Miami, Fla., is one of the cities which owes to dynamite a port accessible to ocean-going ships. Coral rock was blasted from the floor of a wide channel to provide the depth necessary to safe navigation.

When ships collide, or flames destroy, or storms wreck, there is sometimes another safety job for dynamite to perform. It is then that the explosive is put to work to clear channel or harbor of sunken craft or demolish drifting derelicts.

Breaking up a submerged ship is not always difficult for the experienced submarine blaster. There are exceptional cases, however. Take, for instance, the ill-fated S.S. "Alden Anderson," about ten years ago. This tanker, fully loaded with oil, caught fire at a dock at Martinez, Calif. A huge torch, the vessel was towed into Suisun Bay. For seven days the

(Continued to page 114A)

Steel Helmets Sprout Foliage to Camouflage Artillerymen



British artillerymen on maneuvers wearing cloth-covered steel helmets "sprouting" greenery to blend with surroundings

One glance would indicate that army men are borrowing ideas from spring styles in women's hats. The purpose, however, is not floral beauty but camouflage. The steel helmets of Britain's Royal Artillery troops are covered with cloth to which green sprouts can be attached, blending them into the surrounding shrubbery.

Flashlight Incorporated into Battery Discarded When Burned Out



Made to sell so cheaply that it may be discarded when burned out, a new flashlight now on the market incorporates battery, switch, reflector and lamp in a unit. No case, either metal, fiber or plastic, is necessary. The flashlight lasts a surprisingly long time. Its low cost makes it possible to have several for use around the home, garage and office.

Fireboat Pours a Lake on Elevator Blaze

Chicago's new Diesel fireboat pumped 32,150,000 gallons of water at 10,000 gallons a minute on a recent grain elevator blaze, enough to fill a ninety-eight foot tank 566 feet high.

Chicago Tribune

July 21, 1939

Fast Pleasure Cruiser Designed Like Plane

Characteristics of the airplane have been incorporated into a pleasure motor cruiser by Anthony H. G. Fokker, the aeronautics designer. Smoothness of motion, lightness of weight, reduction of vibration and dissipation of noise, as applied to the boat, are features of the streamline craft, which has inclosed airplane-type engines and a structure made of light, strong plywood and

Philippine mahogany. Controls are so arranged that the owner may direct both speed and the course from several points on the boat. Thus, as he stands at the bow, harpoon gun ready for action, he may change speed and turn the boat to right or left by means of dual control hand instruments connected by cables to motors and steering gear if a school of fish is discovered near by. The boat

has space for a twenty-four foot tender with a smaller boat nesting within and for a small-size automobile. Measuring 110 feet three inches over-all, the craft cruises at sixteen to seventeen knots, but boasts a top speed of twenty-nine knots. Power is derived from three engines, one an 800-horsepower Vim-alert and the other two 600-horsepower Capitol-Wright Typhoons, supercharged. A housing and "slumber-type" mufflers help to suppress engine noise. Rubber engine mounts enable the boat to attain speed with mini-



Head-on and side views of the Fokker craft as it would appear plowing through the water, driven by three powerful aviation engines. Cover over the forward deck can be opened with the boom

o/o Air Cruisers, Inc. 233 1st Ave. Clefton, N.J.

Built by Consolidated Shipbuilding Corp. Morris Beach, N.Y.

2 E. 22. \$250,000 experiment

See also page 10/8/37

3/48 35th New York City

num vibration. "Rubbertex" pads, literally air cells, placed over much of the aft bottom of the hull and around the screws, reduce barnacle formation and act as pulsation absorbers. A cover over the forward deck may be opened by means of a boom to permit removal of the automobile and to allow the small boat to be launched. The craft includes accommodations for guests, bathing facilities, a library and a fireplace. Every room has a plug-in radio. In the dining room is an aquarium map mounted vertically, with gold fish swimming gracefully over the topographic effects. Many parts of the Fokker boat were first built in "mockup" style, following the familiar airplane practice of constructing out of light materials before applying the design to a permanent installation.

Metal 'Doughnut' Life Buoy Is Lighter Than Cork



At left is new duralumin lifesaver shaped like airplane tire, in contrast with conventional cork ring

Details of Color Film Magnified by Illuminated Viewer



All the fine details in a slide or color transparency are brought out clearly by an illuminated viewer that enlarges the image. The instrument accommodates the usual two-by-two inch

mounted film slides, holding them at a convenient angle for inspection.

Doughnut-shaped life preservers of duralumin are taking the place of the conventional "torpedo can" buoys on the beach at Santa Monica, Calif. Thirty per cent more buoyant than the old type, the metal life preserver will support four average persons in the water and has an indefinite service life. It weighs three pounds, compared with the twenty-two-pound cork ring which is more quickly destroyed by the elements. Nineteen inches in diameter and five inches thick, the new life preserver is made of two pieces of duralumin.

Farmer's Car Pulls Plow over an Acre in Three Hours



Family sedan hauls a plow over an acre of ground in less than three hours

Instead of hitching up a horse or tractor, one farmer harnesses his automobile to the plow. One man drives the sedan, keeping the car wheels on one side in the previous cut of the plow; his partner handles the plow. In that way they turn an acre of ground in less than three hours. The plow is attached to the rear bumper with a chain at the side toward the furrow being turned.

cont-Jack Parks, 1129 S 3rd

Tom Blaker Club, Calif.
d.w. Rivera

Mt. St. Antonio, elev. 10,000 ft.

What YOU would FIND



Photo at left was taken with ultraviolet light only, while photo above is the same scene taken with infrared rays that pierce the haze. From comparative photos like these, astronomers learn much of atmosphere on Mars



237,230,000 MILES

MARS JUNE 5, 1938

By R. S. Richardson and Glenn C. Moore

Staff Members, Mt. Wilson Observatory

813 Santa Barbara St. Pasadena, Calif.

SEVERAL months ago thousands of people in the United States became panic stricken when they heard on the radio that men from Mars were invading the earth.

At that time Mars was 223,100,000 miles away, almost the greatest distance possible.

But since then the Red Planet has been drawing steadily nearer, until on July 27 it will be only 36,030,000 miles away, the closest approach for fifteen years past and

for fifteen years to come. From a faint speck of light, Mars has grown until now it appears brighter than any star in the whole heavens—a glowing ball of fire low in the southern sky.

Gazing at our nearest neighbor in space this summer, we cannot help wondering what kind of a world it is. What strange things would we find on it? How would we feel there?

on MARS



ON MARS A 10 FT.
JUMP WOULD
REQUIRE LITTLE
EFFORT BY
ANYONE

ON EARTH IT
TAKES A TRAINED
ATHLETE TO
MAKE A 6 FT. JUMP

Circle (left), drawing of surface of Mars. Bottom, posed photo showing how man might appear on Mars. Above, drawings illustrate difference that Mars' low gravity would make in athletic ability

Astronomers have much to learn about Mars, but they do have a very definite knowledge of certain weird effects that an Earth man would experience there as the result of conditions that are actually known to exist from the most recent and the best established astronomical studies.

If we were able to reach Mars, perhaps by space ship, it would be advisable to don a gas mask connected to a tank of air before venturing from our aircraft. For although Mars is known to have an atmosphere sixty miles in depth, it is lacking in oxygen, and may even contain gases that are highly poisonous. Also a high-powered rifle might be handy, for we have no idea of what dangers might await us.

Undoubtedly our first sensation on stepping outside and stretching our legs would be one of amazing lightness. After a few careful trials, we would find that a leap of



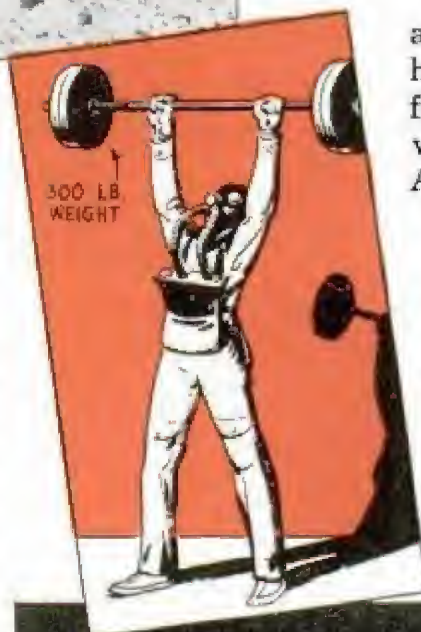
ten feet in the air required practically no effort at all, and that we could still land without hurting ourselves. Similarly, we could throw a rock the size of our head sixty feet, and broad jump forty feet with ease. The task of unloading the space ship would be quite easy, for we could shoulder 300-pound sacks of provisions without much exertion.

In reality we would be no stronger than at the start of the journey, but the force of gravity on Mars is one-third of that on the earth, and therefore we would seem to be three times stronger. This would be a great advantage if any creatures of Mars attacked us, for if their strength is proportional to the force of gravity to which they are accustomed, we should be the equal of three of

them. And if there were too many of them to fight, we should also be able to run faster than they can.

The low force of gravity would probably cause some ludicrous sensations at first. For example, we would have to make a distinct effort to sit down. On bending over, we would discover that the old familiar force we have always relied upon to pull us down the rest of the way is not there any more. And on pouring out a drink, the water would drift lazily through the air as if it were in a slow motion picture. We would also have to set the glass down very gently, for only a slight jar would be enough to splash the water out.

Suppose you had brought along an expensive pendulum clock that had been adjusted carefully before leaving, and a cheap pocket watch for ordinary purposes. After twenty-four hours, if the



100 TIMES
MAGNIFIED

AS SEEN BY
NAKED EYE

1000 TIMES
MAGNIFIED



Top, left, rifle might come in handy. Right, forty-foot jumps and (center, left) lifting 300-pound weight would be possible. Right, relative size of Mars viewed with eye, with small telescope and with Mt. Wilson telescope. Bottom, Mars photographed with infrared rays and ultraviolet light

pocket watch read twelve o'clock noon, the pendulum clock would only have gotten as far as three o'clock in the morning. No matter how many times you took it apart and put it together again it would still go on losing twenty-two and a half minutes per hour compared with the cheap watch.

The trouble arises from the fact that the period of a pendulum depends upon the force of gravity, while the rate at which a spring uncoils does not. The only way to remedy the difficulty would be to make a radical change in the length of the pendulum. On the earth, a pendulum thirty-nine and one-tenth inches long will make a swing once every second, but it would have to be cut down to fifteen inches on Mars to swing once a second. Then the pendulum would drive the clock so that it would keep time with the pocket watch just as it did on the earth.

But even if the two clocks were made to agree, after about a week we would notice something else had gone wrong with them. Gradually both clocks would get out of step with the sun. That is, when the sun was highest in the sky so that we knew the time must be near noon, the clocks might read two o'clock in the afternoon. In this case, the error would be caused by the difference in the rotation period of Mars and the earth, a day on Mars being thirty-seven minutes twenty-two and fifty-eight hundredths seconds longer than here. Therefore, a clock that goes twice around the dial in twenty-four hours would appear to gain about thirty-seven minutes per day on Mars. This would be an easy matter to fix by making a slight change in the rate. It is interesting to note, that the force of gravity and the length of the day on Mars are known by astronomers so accurately, that a space explorer could rate his clock with complete assurance that only a slight adjustment would be required after reaching Mars in order for it to keep perfect time there.

The low surface gravity is caused principally by the fact that Mars is only one-tenth as massive as the earth. While the low force of gravity would give us a funny feeling at first, there is no good reason why we could not soon adjust ourselves to it. Certain other conditions, however, might prove harder to overcome. One of these

(Continued to page 133A)

Masks for Amateur Movies Frame Picture on Screen

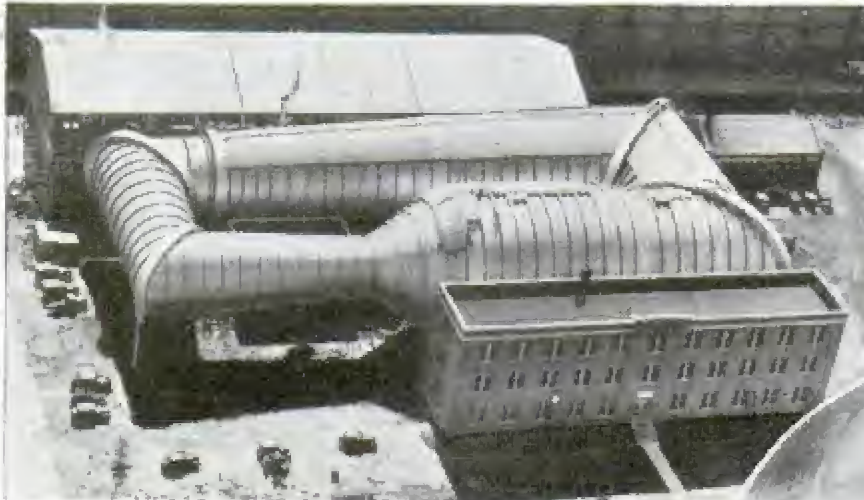


Movie-making with the hooded attachment which holds the various masks shown below

Fade-in and fade-out effects and interesting frames for amateur movies are offered in a kit just made available. The variable iris, easily operated by one finger, makes the fading effects possible for the amateur. Like the framing masks, the iris is available in several different designs. These masks slide into a frame at the front of a five-inch-deep hood mounted before the lens, the hood itself acting as a sunshade and holding the keyhole, diamond, heart, oval or other frame far enough from the lens so that its outline is sharp. The mask box is easily attached and centered, being designed for attachment to any eight or sixteen-millimeter movie camera. The movie maker may show on his screen a family closeup framed appropriately in a heart, a distant ocean liner framed as if seen through binoculars, an interior or garden scene framed in a keyhole.

Deshee Product Corp. Trenton, N.J.

500-Mile Speed Sought in Latest Wind Tunnel

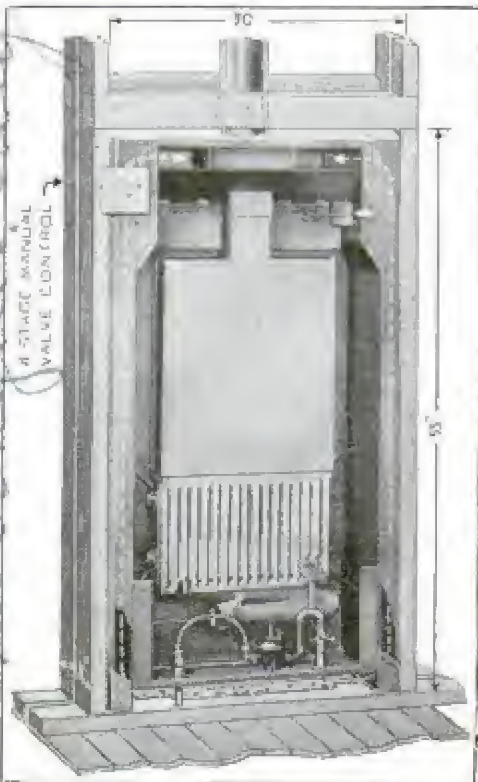


View from above of new wind tunnel. Below, sixty-foot sphere in which stability of planes is tested through the medium of model aircraft



Latest step in the development of improved methods of solving aerodynamics problems is a nineteen-foot wind tunnel at Langley Field, Va. Experimental work looking toward the possibility of airplane speeds up to 500 miles an hour will be done in the tunnel. A steel sphere, sixty feet in diameter, is a part of the equipment. Holding pressure of two or more atmospheres, the sphere enables research engineers to study the stability and handling of large planes as duplicated in small models.

Gas Heater Installed in Wall Eliminates Furnace Room



Diagrammatic drawing of gas heater built into wall, and photograph of finished wall showing grilles for air circulation

Low-cost heat for the home or apartment is provided by a gas-fired unit that is built into the wall of the room, eliminating the need for a basement furnace room and ducts, and saving the heat loss involved in a central system. The heater fits between the studs and is plastered in so that only the four-stage manual control regulating heat volume and the two louver-type grilles are visible. Cold air is drawn from the floor through the lower grille and mixes with fresh air from outside; heated as it passes around the radiator, it emerges into the room.

Andrews Heater Co. 1950 W. Jefferson Blvd. Los Angeles Calif. 9441

through the upper grille. Two rooms can be heated by a single unit installed in the dividing wall with grilles opening on each side. Rock wool and metal sheeting insulate the walls from the heater. A vent to the roof from the baffle-plated firebox carries gas fumes outside. The heater has an hourly output of 25,200 British thermal units.

2620.

Air-Line Travelers Ride 81,058,127 Miles in 1938

Air travel on American-operated lines both here and abroad smashed old records again in 1938, the number of passengers increasing twenty-one per cent over 1937 to a total of 1,536,111, while the number of revenue miles flown reached 81,058,127, a five-per-cent gain. Air express rose more than five per cent to 9,452,600 pounds. At the close of 1938 there were 345 airplanes operated by the scheduled lines, and they burned 45,310,192 gallons of gasoline and used 829,870 gallons of oil last year. The air lines employed 13,309 as the year ended, including 820 pilots and 605 copilots, 310 stewardesses and 141 stewards; office employees, however, totaled 4,724, outnumbering all other classes, and 3,415 mechanics and riggers were second in number. Of the 104,964 scheduled flights started, on domestic lines. 95.36 per

Crewless Electric Rescue Boat Is Piloted by Cable from Shore

Chase Runner



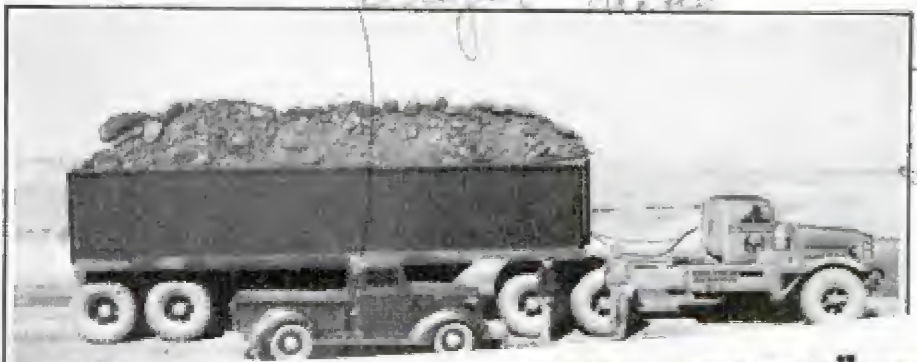
Preparing to launch electric lifesaving boat which is navigated by remote control by coast guardsmen on shore through impulses sent by cable

Plowing through the surf without a crew aboard her, a seagoing "robot" boat steers unerringly toward a ship in distress, carrying a lifeline and rescue equipment. Powered by a storage battery, it makes ten knots, hauling through the water behind it an insulated cable through which the coast guard crew on shore sends directional impulses guiding it to its goal. The electrical rescue craft is undergoing tests at the San Francisco coast guard station.

478

Giant Electric-Drive Truck Hauls Seventy Tons

Electricity furnishes the driving power for a huge truck capable of hauling a seventy-ton pay load of coal, which is in service on a four-mile road between a mining pit in Hume, Mo., and the tippie. Traction motors joined to the two rear-end drives receive their energy from two General Electric generators which are connected directly to a butane-burning Hercules engine under the hood of the truck. Total weight of both load and equipment is 103 tons. The trailer is thirty-five feet long and ten feet high.



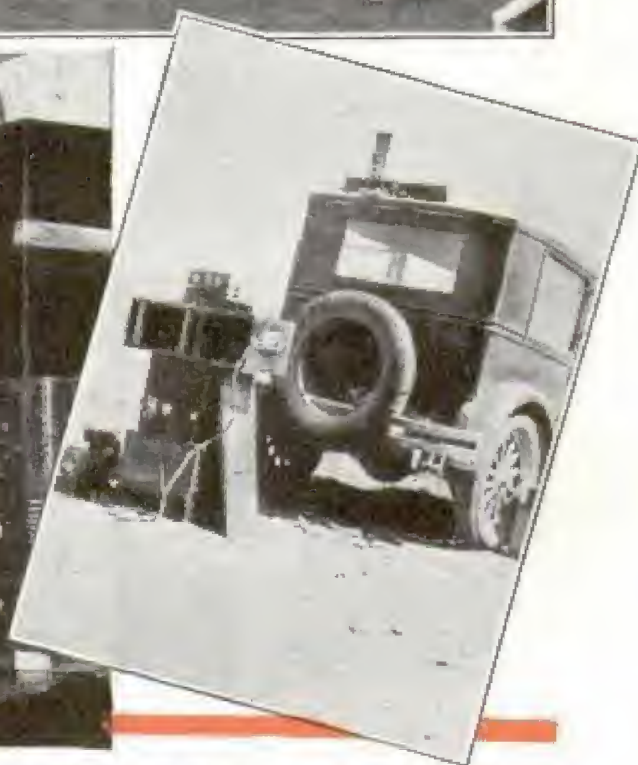
web plant truck Co. Kansas City Mo.

Crewless electric boat, patented as ~~Rice~~ "Rice Runner"---
Clarence Lents, inventor, at 457 Hanover Street, Oakland, Calif.

enormous size

Hercules Motors Corp.

"QRR - PREPARE"



WIHJW (top) was transplanted to Red Cross headquarters in Hartford, Conn., during 1938 hurricane. Wilson E. Burgess (bottom, left) was awarded William S. Poley Amateur Radio Award for outstanding work in hurricane. His station maintained only contact between Westerly, R. I., and outside world. Emergency setup (right) with transmitter on top of auto

HURRICANES strike . . . rivers burst their banks and flood whole states . . . telegraph and telephone wires go down . . . and a vast army of radio amateurs springs into action to supply all-essential communication to rescuers and to an anxiously waiting nation.

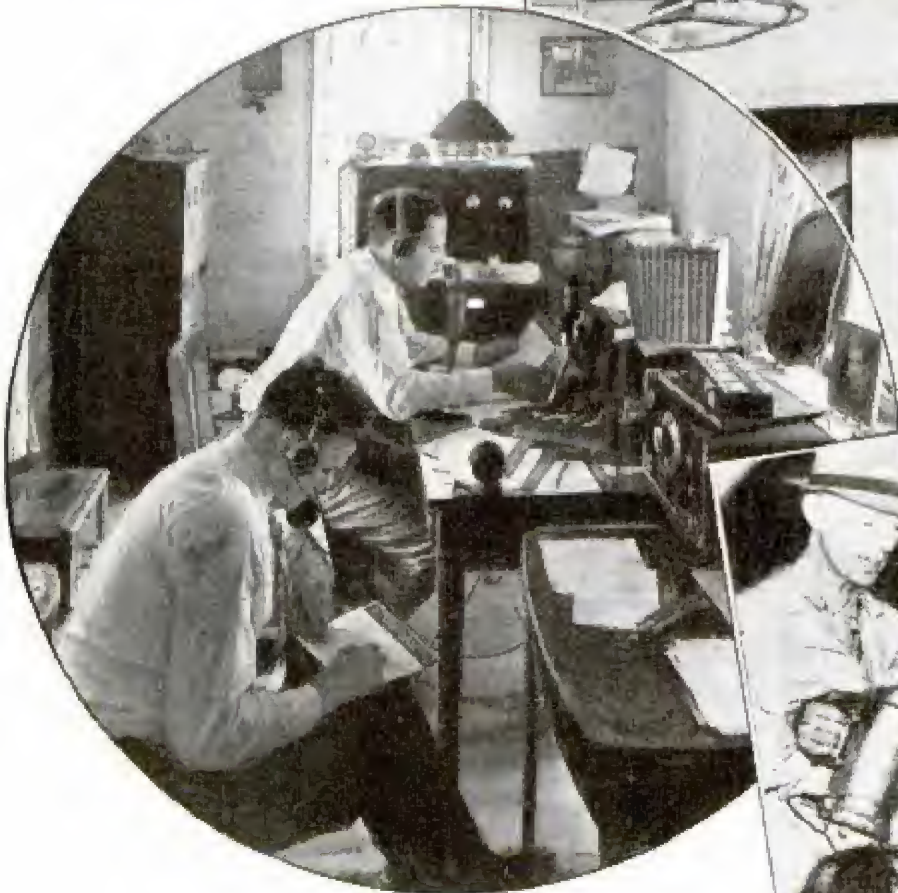
Aptly described as "minute men of the air" several years ago because of their work in emergencies, radio amateurs, or "hams" as they are often called, are fast

becoming a trained army of radio operators so that they may wage war on disaster more efficiently. An emergency corps is being formed, under supervision of the American Radio Relay League, the amateurs' national organization, so that any new emergency may find them prepared to answer a "QRR," the league's "SOS."

Brought into being after the Ohio river flood in 1937, the corps has for its general principles the coordination of amateur ac-

for the WORST!"

tivity under centralized control by local amateur appointees known as "emergency coordinators." That this plan is effective has already been demonstrated, first in the Santa Ana flood in California and then in the New England hurricane. In each instance, the traditional fine performance of amateurs in emergencies was far surpassed in



those areas where the plan has been instituted.

When the city of Norwich, Conn., was struck by a record flood and an eighty-mile gale last fall, wire and power facilities were wiped out. Norwich amateurs, as soon as the peak of the wind had passed, quickly began to assemble their equipment, realizing that a major disaster had occurred and that their services were badly

(Continued to page 122A)



Top, Buckeye Short Wave Radio Association operating W8KG/8. Circle, W1SZ, West Hartford, handling messages during hurricane. Bottom, amateur operators take time out for lunch during 1938 A. R. R. L. field day

Windsor. La Verne Amateur Radio Club, N. C.

Voice Booster Helps Guide Explain Noisy Machines



Guide's voice can be heard above machine noises by visitors when he speaks through portable amplifier

Twice as many people can be handled by a guide who uses a portable amplifier in the factory where machine noises would drown out his natural voice. Including batteries which are carried on the hips, the equipment weighs fifteen pounds. Being directional, it emits sufficient volume for a group of visitors without disturbing men at work. Strapped across the chest, the amplifier gives its wearer complete freedom of both arms.

Pipe Cover Keeps Hot Ashes from Dropping in Car

Pipe-smoking motorists can eliminate the hazard of hot ashes dropping into the



Sparks can't fly out of pipe guarded by this cover. Inset shows how stem packs ashes as tobacco burns

car by fitting their pipes with a safety cover. A perforated cap is attached to the bowl, and sliding through its center is a stem having a perforated head at its lower end that exerts a slight pressure against the tobacco. Mounted on the stem is a spring that does the work. Continual pressure, it is claimed, crumbles the ashes, retains the sparks and ashes, helps keep the burning tobacco from going out, and burns the tobacco to the last grain.

Portable Lights for Outdoors Easy to Install

To supply temporary outdoor illumination at carnivals, athletic events, construction projects and factory yards, portable lighting standards now available are easy to erect. The bracket, holding three 500-



Tall floodlighting tower can be erected quickly. Right, arm swings down to change bulbs

watt bulbs, can be rotated to direct the light wherever it is wanted, and the tall arm is pivoted to swing downward for convenience in changing bulbs. In upright position the arm is secured by a padlock. The supporting legs are fastened by bolts to metal stakes driven into the ground.

Short Waves Pilot a Ten-Foot Model Airplane

Rudy Arnold Photos



Top, left, assembling the radio-controlled model plane. Fourteen-ounce two-cycle engine burns gasoline mixed with oil, developing one-third horsepower at 4,000 revolutions per minute. Upper right, the plane in flight, and tuning its radio receiver to five-meter ground transmitting unit which sends controlling impulses



547 Atlantic Ave

Joseph Raspante, Brooklyn radio service dealer, spent two years building a model plane six feet long with ten-foot wing-spread that can fly for nine minutes on two-ounce fuel supply under remote control. A telephone dial selector provides six control actions governing speed, stop, banks, turns, etc. The top speed is twenty-five miles an hour. The ship responds instantly to radio signals within a two-mile radius. At left, Raspante watches test flight with Jacqueline Cochran, aviatrix, at controls. Above, loading cells which energize magnets controlling plane



16,000



Top, course of the "Vagabunda" and an over-night camp. Below, the author with an hour's catch of fish on the tropical coast of Mexico



By Dana and Ginger Lamb
21-325, Santa Ana, Cal.

IT ALL started as a test. Since childhood Ginger and I had wanted to become explorers, but the mechanics of the thing had us stopped. There were no books on "how to become an explorer." We read accounts of many an expedition, but none explained how they did it, other than to mention the great expense, the vast equipment necessary, the tremendous task of transporting it, the unpleasant differences arising among members of the expeditions, and the difficulties with native porters and guides. It all sounded very disheartening.

If, however, it would be possible to go exploring without having to bother with bulky provisions and equipment, native guides, and all the other impediments to a carefree vagabondage, how comparatively simple it would be to penetrate the unexplored regions of the world.

MILES *on* \$4²⁰



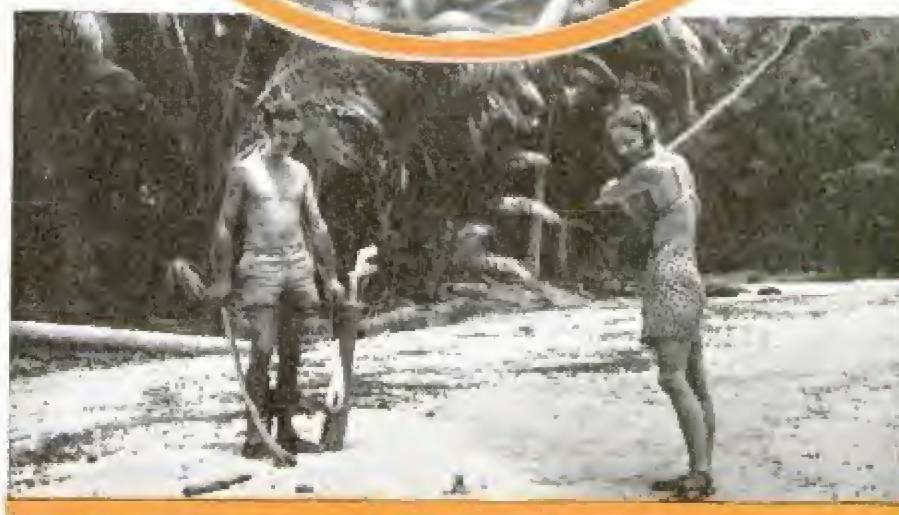
Above, portaging by oxcart, miles from water. Below, carving a hardwood golf club, and golfing on Cocos Island. The bag was woven of palm fiber



Then we had an idea. Providing food, clothing, and shelter in out-of-the-way places was nothing more than a problem of mechanics. People from the beginning of time have done it—the Eskimos, the Africans, the South Sea Islanders. By simple mechanics they had manufactured all the necessities of life out of the materials at hand. Why couldn't we? At least, it was worth a try.

As our testing ground we chose the west coast of Mexico and Central America, because its thousands of miles of jungle shores and rivers contained many areas marked unexplored. And that was the beginning of the three-year voyage in a sixteen-foot canoe.

We chose the canoe not





enough to paddle easily when loaded with our equipment.

That was asking a lot of a boat. We sought the advice of a boat-builder. "You can build a sailboat," he said, "and you can build a surfboat. You can build a canoe, kayak, or dory. But you want a combination of all those boats, and such an animal just can't be built!"

So we went out into the backyard with a hose and a couple of shovels, and soon had a pile of mud eighteen feet long, four feet wide and three feet high. Then we started whittling out the form

with any idea of a stunt trip, but because it was the most logical means of transportation. The two of us could have handled a larger boat very easily, but we wanted to explore the shallow bays, rivers, and back country. Obviously this was impractical with a larger boat, so we set about the construction of a craft suitable for our purposes.

It was our first attempt at boatbuilding. We realized we couldn't just set up a stem and stern, bend a few ribs, tack on some siding, cover the results with canvas, and have a craft that would do the things we'd have to demand of it. Our craft must be a good surfboat, a good sailboat, stanch enough to ride out storms, light enough to portage, husky enough to turn impromptu cartwheels in crashing surf and buoyant



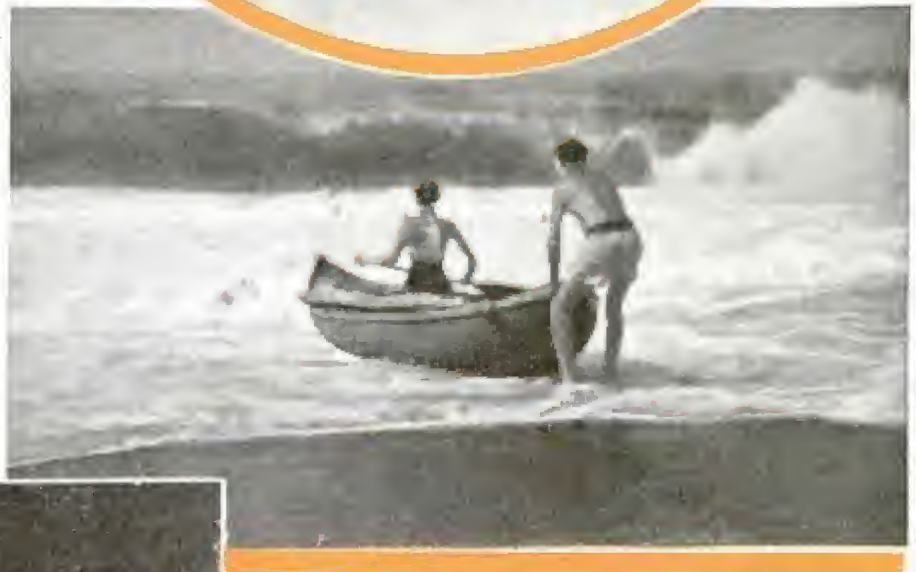
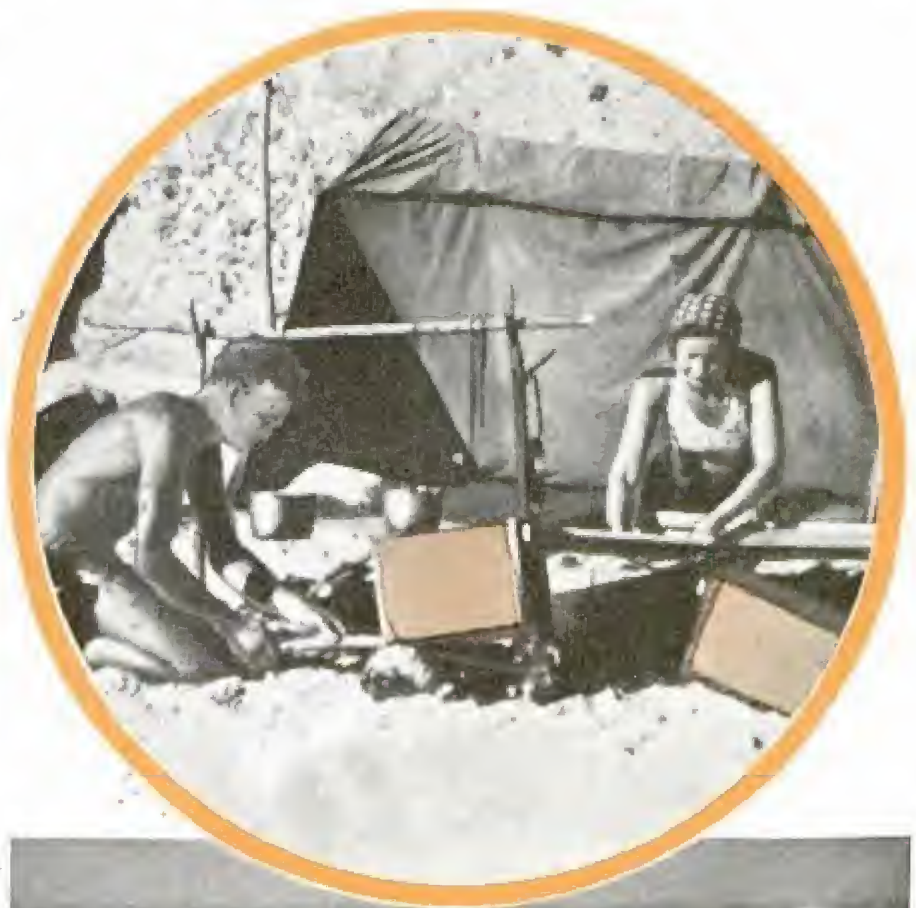
Top, the "Vagabunda" ready for plywood decking. It was built of hickory and mahogany fastened with 7,000 brass screws. Center, firemaking in prehistoric way. Bottom, sailing toward a Mexican village

of the "craft that couldn't be built."

When the mud form was carved down to the graceful lines that incorporated the best qualities of the various boats it represented, we faced our first problem. We had the outside dimensions. How to arrive at the inside dimensions? Finally, taking several boxes of matches, we cut small pegs which were equal to the thickness of the ribs, siding and canvas of our proposed craft, and pushed them in all over the form. Then we shaved away the mud to the base of the pegs. This gave us the inside dimensions.

We cut channels for the stem and stern, keel and gunwales, and then using a steambox—an old fifteen-gallon oil drum serving as boiler, and several lengths of stove-pipe for the "box"—we started steaming, bending, and fastening.

After several months of figuring out problems of



construction as they came, setting over 7,000 screws, breaking and discarding twice the material that went into the craft, we had the hull completed. Decking over the craft with airplane plywood, we left a watertight cockpit just big enough for two.

We equipped the canoe with Marconi rig carrying 100 square feet of sail, paddles, harpoon and killing lance, and then started on supplies. The biggest job was condensing equipment to our limit of 150 pounds.

With this completed we were ready to start—but not on the trip. Eighty per cent of the success of any expedition depends upon preliminary training. We spent over a year along the California coastline, tak-

(Continued to page 118A)

When water holes turned out to be dry, a couple of old cans and a copper tube were rigged up to distill sea water, top. Center, shoving into the breakers. Below, gold prospecting with a handmade sluice box

Robot Shows Man's Heartbeat Amplified in Sight and Sound



This transparent, life-size figure of a man demonstrates visibly the valve action of the human heart

Human heartbeats are made both audible and visible by a mechanical robot that reproduces and amplifies the actual rhythm of a man's heart. While an entire audience listens to the thumping of the human "pump," the device records the number of beats and the amount of work done by the heart under various conditions. Then a life-size transparent figure reproduces visibly the action of the human heart valves.

Grain Dust Foreseen as Auto Fuel

Grain dust and other farm products will be burned as fuel in the internal combustion stationary and automobile engines of the not distant future, predicts Dr. David J. Price, chief of the chemical engineering research division of the Bureau of Chemistry and Soils, in the Department of Agriculture. The first Diesel engine burned coal dust, and other solid fuels have proved successful experimentally in Diesel-type engines. One of the difficult problems has been scavenging the combustion chamber—ridding it of the ash left from combus-

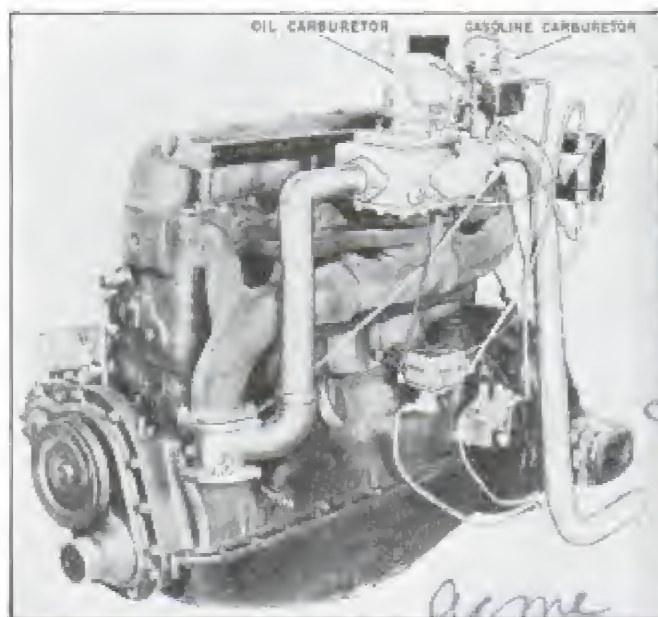
tion. Dr. Price, who is directing government research in the creation of new markets for farm products, is confident that within a year or two there will be engines operated by the explosive power of dust from grain, starch, flour and other products of the farm.

Stop Lights Blink Slower as Brakes Are Applied

Flickering stop lights that blink more slowly as the car itself slows down give a positive warning to the car behind that brakes are being applied. This flicker unit is "synchronized" with the car wheels, being driven by the speedometer cable. The mechanical connection is made by inserting the unit between the speedometer instrument and the cable.

Motor May Burn Gas or Oil by Fitting Special Unit

By equipping truck, marine or stationary engines with a newly developed unit consisting of carburetor and cracking unit, the power plants can be adapted to burn gasoline or oil. The motor starts on gasoline and begins burning stove oil, a much cheaper fuel, after warming up. When the



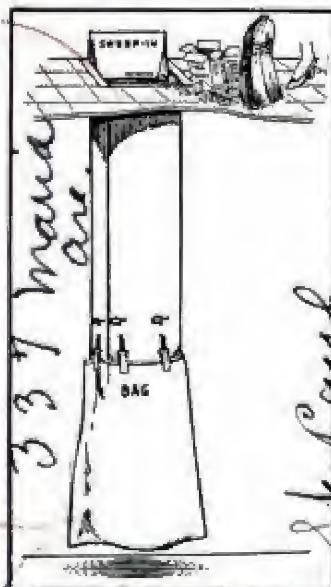
Oil and gas burning engine has two carburetors and switch for changing from one to the other

The Advance Sales Co.

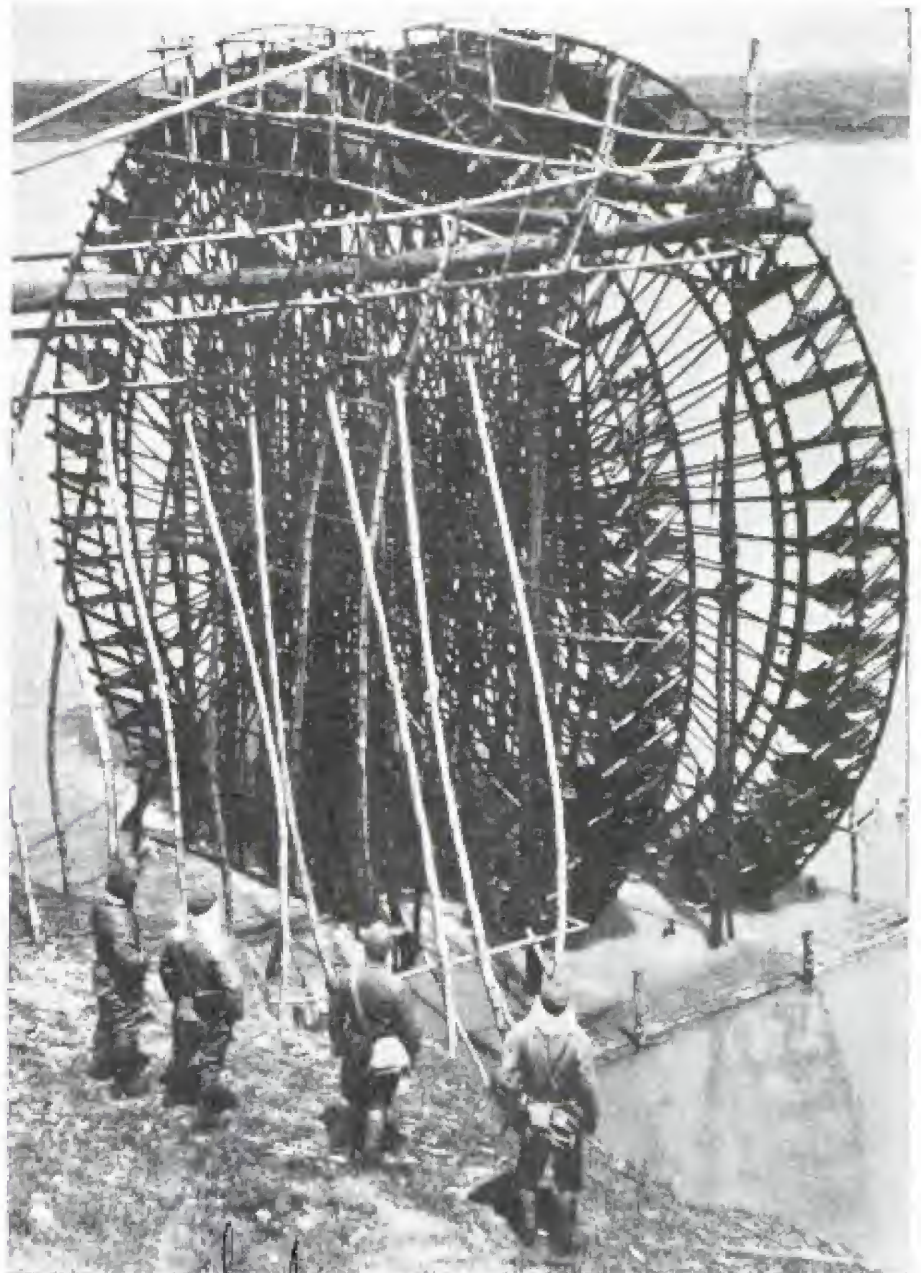
motor is idling, it runs on gas, but when it starts pulling in gear, it burns the oil. The change from oil to gas and back again is accomplished by the use of two carburetors, one of which is a part of the special unit, operating independently, and a fuel switch that is controlled by thermostat. This switch changes from gas to oil when the engine reaches a temperature high enough for the oil-cracking unit to function. The conversion unit may be fitted to an engine with few adjustments.

Built-In Trash Chute Empties into Bag in Cellar

Handy disposal of household waste is provided by a built-in wastebasket just invented. A galvanized iron chute cut through the kitchen or hall floor is covered by a hinged lid. It empties into a bag just above the basement floor. Suitable in the home for a laundry chute or wastebasket, it can also be installed behind counters in stores.



Giant Old-Time Water Wheel Still Used on Chinese Island



Primitive when compared to modern irrigating machinery, this water wheel still does a good job on a Chinese island taken over by Japanese

When Japanese soldiers took over Hainan island off the coast of China, they found a giant old-fashioned water wheel being used to irrigate paddy fields bordering the Nantu river. Compared to modern methods of irrigation, the water wheel is crude, but it still serves its purpose in a region into which few of today's engineering and mechanical marvels have been introduced.

Air Passengers Five Times as Safe as in 1930

Passengers on scheduled air-line flights in the United States last year were five times as safe as in 1930; the sky liners flew 22,308,771 passenger-miles for every passenger fatality, compared with 4,000,675 passenger-miles in 1930.

at North Island, San Diego



The HIGH SEAS FLYING PATROL

SEVEN men in the big Navy flying boat sat awe-struck at their posts watching the wild play of the storm. An uncanny light of St. Elmo's fire glowed around the plane's bow. The pitot tubes sticking out from the wings looked like flaming torches and the propeller tips drew circles of blazing flame in the air. Lightning flashes lit up the interior as the fourteen-ton flying boat rose and dipped in the rough air.

Close at hand but out of sight in the zero-zero tropical storm were thirteen other patrol planes of the formation. The radio sets were shooting out sparks and communication was impossible. Each pilot had his orders and knew what to do. Cloudbursts of rain poured on the broad wings and up at 15,000 feet, where some of the planes had climbed, ice was cracking off the pulsing de-icers and it was snowing.

For an hour and a half the fleet of bi-motored planes battled the high-altitude storm. Then they broke through the clouds, re-formed their lines in the moonlight and resumed their flight from San Diego to Coco Solo in the Canal Zone. To the ninety-eight men in the aerial fleet the spectacular storm was simply an incident in another long range mass flight, a routine operation for the husky patrol planes of the Navy's aircraft scouting force. The big Consolidated PBY patrol planes are set-

ting records for smashing through any kind of weather to get to their destinations.

"Planes will start going over the side at ten hundred. Rendezvous at 4,500 feet above Point Loma." The order from the wing commander marks the beginning of a



Official U. S. Navy photograph

Top, big patrol boat on its beaching gear. Bottom, Navy scout observation plane shows it can take it in rough-water landing tests

off Naval Air Station



typical flight, in one recent case a routine "ferry" job of flying seventeen of the patrol planes to Hawaii, a 2,500-mile non-stop flight from San Diego. At ten o'clock in the morning the big flying boats move down the ramps into the water, drop their beaching gear and move off in slow climbing flight.

Flying in a wide circle at the assembly point, the wing commander waits until the last plane has taken its place, then picks up the radio microphone that connects him with every pilot.

"Take departure from Point Loma. Initial course 259 magnetic. Indicated air speed 100 knots. Planes acknowledge." He checks the replies as he hears them. "Nine prep two aye aye." "Nine prep three aye aye." When the last plane has answered, he gives the final instructions. "Take cruising disposition." Looking back through a window he watches the planes string out into loose formation at one side.

On board each plane the men on watch settle down to their work. Two pilots, a navigator,



Pilot in cockpit of PBV flying boat; Navy patrol planes above the clouds in mass long-range trans-oceanic flight, and interior of one of the huge all-metal flying boats. (Top, left, and bottom photos by Warner Brothers)



two radio men and two engineers make up a normal crew and most of the men are proficient at several kinds of duty. Watches are four hours on and four hours off, the men off duty resting in bunks in the fuselage. Each plane is responsible for its own navigation as well as maintaining its place in the formation and the navigators report by radio to the wing commander every two hours, the formation thus getting seventeen individual checks on its position.

The interior of one of these flying boats looks like no commercial airplane you ever saw. Upholstered seats, gay decorations, and the wide aisles of a passenger transport are lacking. The cabin compartments resemble the interior of a submarine more than anything else. Watertight doors and

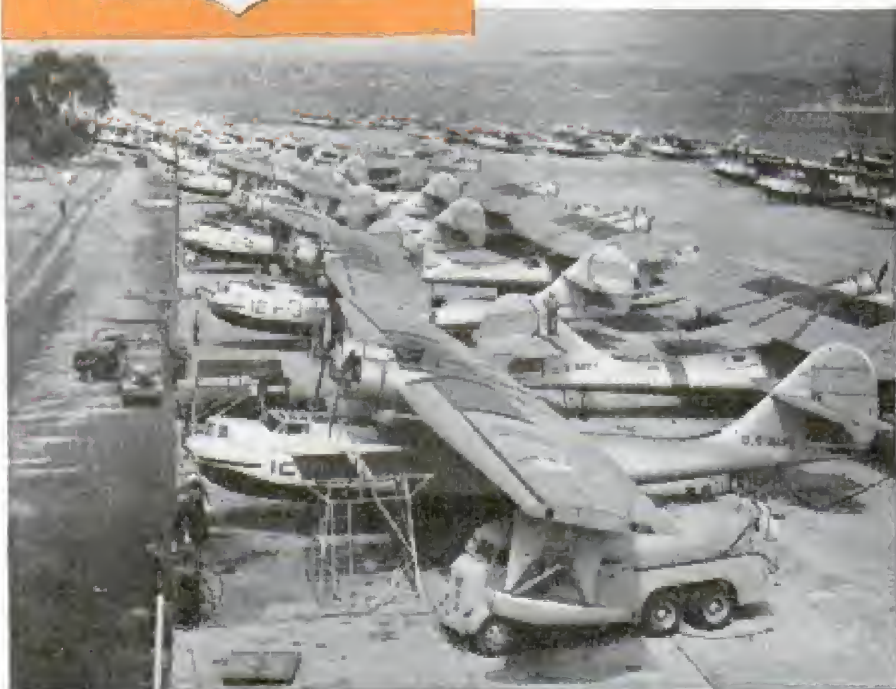
quantities of military gear complete the illusion.

Normally inter-plane radios are silent, but two hours out from San Diego the wing commander spots a storm ahead and issues an order. "Heavy cloudbank ahead. All planes climb at 300 feet per minute to conform to motion of leading plane. All planes acknowledge." He levels off at 12,000 feet, 1,500 feet above the clouds. From now on the navigators rely on sun sights alone for their positions, since they can no longer estimate wind drift by watching the surface of the sea. To shoot the sun a navigator points his octant at the sun through one of the plane's windows.

Another way the flight keeps track of its position is by radio. There are occasional surface ships down below the clouds as

well as the three airplane tenders that have taken up stations 600 miles apart on the great circle course. The radioman of the leading plane calls a convenient surface ship, learns its longitude and latitude, and then takes a series of radio bearings on the ship to get his own position.

Weather broadcasts and



Top, looking aft in flying boat, with pilot and assistant at their stations. Center, insignie of Patrol Squadron Nine. Bottom, big flying boats lined up at Naval Air Station at San Diego, Calif., during filming of "Wings of the Navy"

special weather details from ships at sea are received at the radio desk and are turned over to the pilots and navigators. For inter-plane communication by their personal radio equipment, pilots reduce standard phrases to initial letters and use key words in place of the initials to avoid misunderstanding. In this code "Affirm" stands for "A," "Baker" for "B," and "Cast" for "C." "Prep" is the word for "P" and when a pilot reports "Nine prep one" he means "9 P 1," the Number One plane of the ninth patrol squadron.

By this time it is well along in the afternoon and the 119 men of the flying fleet, bundled up in heavy flying clothes against the cold, are getting hungry. One of the men off duty in each plane goes to work in the galley. Hot soup and coffee are prepared on the electric ranges and scrambled eggs, bacon, and toast are served on paper plates.

Late in the afternoon the clouds begin to dissipate and the commander orders a slow descent to 6,000 feet where the latest weather map shows a favorable wind will be found. By the time the planes have leveled off again the weather is completely clear and the flying is smooth. By 5:30 the fleet is nearing the halfway mark and the navigators get their last shots of the sun. Running lights wink on as the sun sets. Pilots' compartments are darkened so that only the glow of the instrument lights is visible. From now on navigation is going to be easier, because the navigators can point their octants at three or more stars to get a positive fix. Planes in a formation tighten up after dark to keep easier track of each other. If the leader enters clouds each plane goes into a slow climb and veers away from the center of the formation to avoid any possibility of collision.

The needles of the air speed in-

(Continued to page 126A)

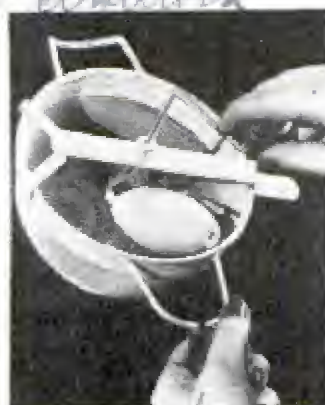
Gas Helmet Worn by Diver Gives Him Air under Water



Diver leaving water after proving ability of gas helmet he is wearing to supply a man with air while working below surface

Boat repairmen and inspectors may get out and get under vessels if they wear a gas helmet developed for fighting fires in fume-filled quarters, which recently has been adapted to underwater use. Recent tests by Federal bureau of marine inspection and navigation demonstrated its ability to supply air to a diver while submerged.

Food Mill with a Wooden Roller Mashes Food into Strainer



Mashing and straining foods are combined into one quick operation by using a food mill with a wooden roller. As the handle is turned the roller rotates, pressing the fruit or vegetables through the strainer. It can be used for ricing potatoes or other foods without paring them.

Low-Priced Small Camera Has Built-In Flash Gun

Press, Jr. \$ 7.95



Battery-operated flash bulb fits in top of camera and is synchronized with shutter

Flash bulb and reflector fit into the top of a low-priced miniature camera that has its synchronizer built in, making "candid" flash-gun pictures at night available at small cost. You press a button and both shutter and flash bulb are released. Simple in design, the camera has universal focus and fixed exposure time.

Many-Purpose Wrist Watch Tells Speed and Distance

You can tell time to one-fifth second by three of the six hands on a wrist watch



Six-hand watch has many uses in sport and industry

just introduced, but that's only one of its many talents. Primarily designed for aviators but useful as well for timing industrial operations, radio programs, races and scientific work in the laboratory, it combines the features of a stop watch, a time-out watch, tachometer and several other purposes. The long second hand, clicking off fifths of a second, tells on the tachometer scale the speed in miles per hour of any moving object on a measured course—automobile, airplane, pigeon, runner. The dial is marked for speeds from sixty to 500 miles an hour, but by simple computation the speed can be figured from a fraction of a mile to 18,000 miles per hour. Start the hand at the flash of a lightning stroke or the appearance of gunshot smoke and stop it when the sound is heard, and the sweep second hand will indicate on telemeter scale the distance in miles from the source of sound to the observer. The watch also has thirty-minute, sixty-second and twelve-hour registers.

Thermometer on Wall Switch Is Handy to Read

Temperature changes in each room can be watched more closely by installing switch plates with thermometers built in. The instruments, mounted on plates of conventional size, register from twenty to 120 degrees and are easy to read.



'Shock' Is Grounded Out of Auto through Conducting Tires

Passengers boarding or leaving vehicles are protected against shock by pneumatic tires recently developed in France which provide a ground to remove electricity from the body. The new tire is said to be made of a rubber compound having a specific electric resistance of less than fifty ohms per cubic centimeter, whereas the

Crosley Radio Corp. Chicago

Thermometer Co., 2901 Oak Ave. St. Louis, Mo.

about \$34.50 up

Jardine & Co. Importers

Shure Tire Co.

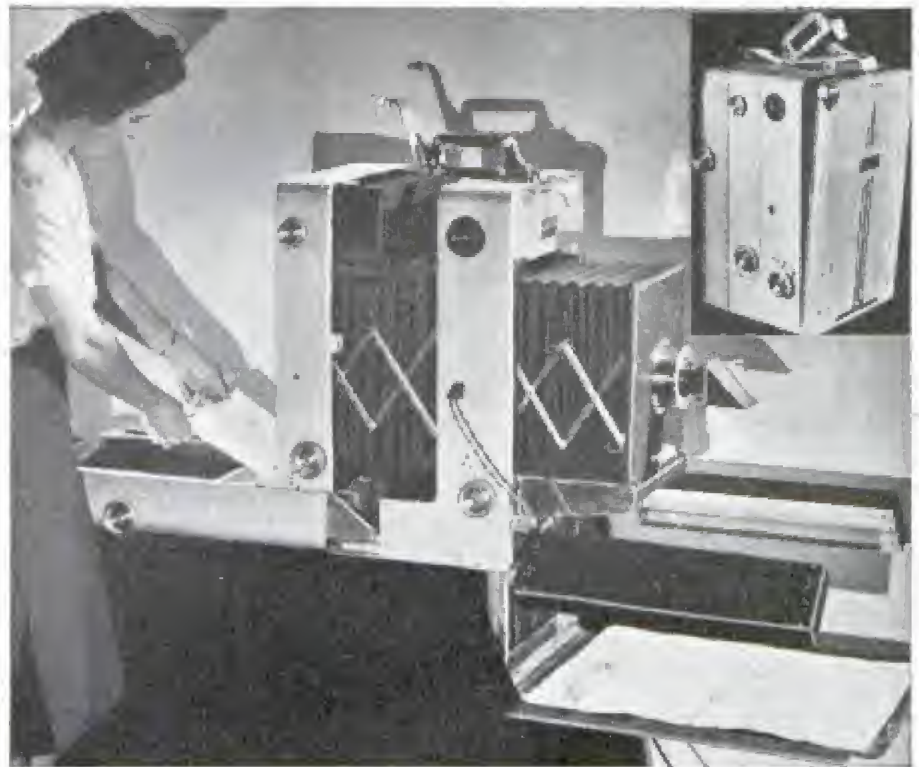
resistance of ordinary rubber compounds used in tires is more than 100,000,000 ohms. Its use is of particular importance on electric buses where a shock might be experienced if a power circuit became grounded.

Lock without a Dial Has Thousands of Combinations

Without either a key or a dial, a combination padlock just introduced is practically impossible to pick. There are four projecting tabs on each side of the padlock, and each tab has three possible positions. Knowing the combination, you can move the tabs to the proper position and open the lock.



Portable Photo Copier Folds Like a Trunk When Carried



Picture to be copied is placed on shelf in right foreground whence it is reflected through camera lens. Inset, copier closed up like trunk

Entirely self-contained, a portable photo copying machine now on the market is complete with camera having an adjustable focus, spool of sensitized paper, built-in severing device that cuts paper to proper size, and all the developing chemicals. When folded for carrying it closes up like a trunk. It is not necessary to drain the liquids. The camera has a self-timer synchronized with the lights to turn them off when proper exposure has been given. Material to be copied is held by the front of the case which drops down and can be adjusted vertically. Made in two sizes, the larger unit weighs sixty-eight pounds and the smaller thirty-eight.

"U" Table with a Tilting Top Will Fit over Bed or Chair

With a tilting top and adjustable height, a "U" shaped table makes itself useful for a variety of purposes. The open end permits it to be used as a bedside or chairside lap table. The metal frame adjusts for any height from twenty-four to thirty-six inches. The table will support a portable typewriter.



Tilt-top table is adjustable in height from two to three feet

Paint used in the United States every year would cover a fence 500 feet high encircling the earth.

The SCOOTER



Production of motorized scooters is an infant industry that is growing fast. Left, three-wheel car, one of the adaptations of the scooter

Last year only 5,000 motor scooters were turned out by all the companies in the field. This year, one Chicago company expects to build 10,000 units. The motor scooter is a sturdy little workhorse, as well as a pleasure vehicle

Low. Price
attachment
\$12.00



Center, the scooter facilitates car delivery. Left, loading package sidecar. Above, streamline wind-break dresses up the scooter. Note the headlamp

Taken over by... Co.

1200

Sea-Scooter Model 2 2490

GOES TO TOWN



Top, the scooter even goes to sea in this form. Center, left, light delivery scooter. Right, trailer attached to the scooter makes possible cheap delivery. Parking on the sidewalk is an additional advantage



Trailer 49.50



Left, power plant and transmission hookup of the typical scooter. Speeds around thirty-five miles per hour and super-economy are features. Up to 120 miles on a gallon of gasoline is possible. What the future holds for the scooter no manufacturer can predict. The fact that it has survived the fad stage augurs well for its permanency as a means of transportation

Solo-standard 111.50 net

Double Barrier on Racetrack Ends False Starts and Backing



Led into these padded stalls with gate in front and bar in back, horses cannot back or break away until starter opens gates simultaneously

Two-way barriers are being tried out at a California race-track as a means of preventing the horses from either making false starts or backing away from the gate. The new gate is similar to the old type, padded to protect the horses, and with a hinged front gate that opens when the starting bell rings, but a bar has been added in the rear to keep the horse from backing out of the stall. This assures a fair start to all, and eliminates the need for several assistant starters to hold the horses in the stalls, as is now necessary.

Speech Is Only a Buzz and a Hiss Electric Filter Shows

Whether you're a sweet girl graduate, a bellowing orator or an operatic tenor, your voice is nothing but a buzz and a hiss. And Bell Laboratory scientists have devised an electric filter machine that can translate your speech into the quavering voice of an old man or that of a baby. The machine demonstrates that speech consists of two variable streams of sound: the hiss, a noise without pitch; and the buzz, whose pitch is determined by vibration frequency, whose intensity is fixed by the speaker's power,

and whose quality is determined by the relative amounts of sound power carried in various frequency bands. The speech analysis instrument splits the human voice into twenty parts, and by using the buzz sound at constant pitch can make a sentence emerge as a chanting monotone. A slight shift changes one vowel sound to another, turning the spoken word "rat" into "rot" or "rut."

Bathing Cap's Float Helps Keep Head Above Water

By fitting a rubber bladder at the back of a bathing cap, an inventor has created a lifesaver that will help a swimmer keep his head above water in emergencies. It supplies enough buoyancy to enable its wearer to stay afloat if he is caught in an undertow or paralyzed by cramps. The bladder is easy to inflate. Beginners will find it an aid in learning to swim.



Cap with "life preserver" at nape would lend enough buoyancy to keep swimmer afloat until help arrives

Bridge Model Carved with Homemade Knives



Model builder used razor blades and knives of his own making in constructing this copy of Delaware river bridge. The model extends thirty feet from end to end including the approach ramps

Using only razor blades and homemade knives for tools in its construction, Dominick De Gregorio of Philadelphia, Pa., has completed a thirty-foot model of the Del-

aware river bridge. The builder spent more than 14,900 hours and \$1,000 in the making. Balsa wood was used in the bridge, which is twenty-two inches high.

Portable Milker for Dairy Barn Eliminates Pipe Line

With a portable milking machine and a pump on wheels, pipe lines for milk in the dairy barn are unnecessary. The pump unit, which draws milk from the cow and delivers it to the milking pail entirely under vacuum, weighs 175 pounds and is powered either by 110-volt alternating current or thirty-two-volt direct current, driving a one-third horsepower motor. A ground wire to prevent shock and a thermostatic circuit breaker which guards against motor damage from overheating are safety features.



Portable milking machine delivers milk to covered pail under vacuum

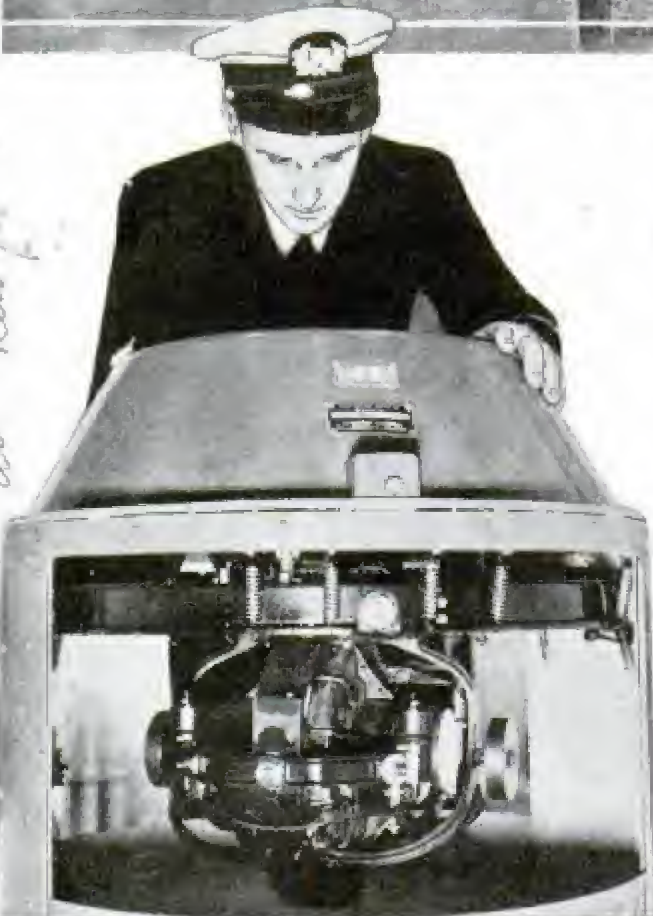
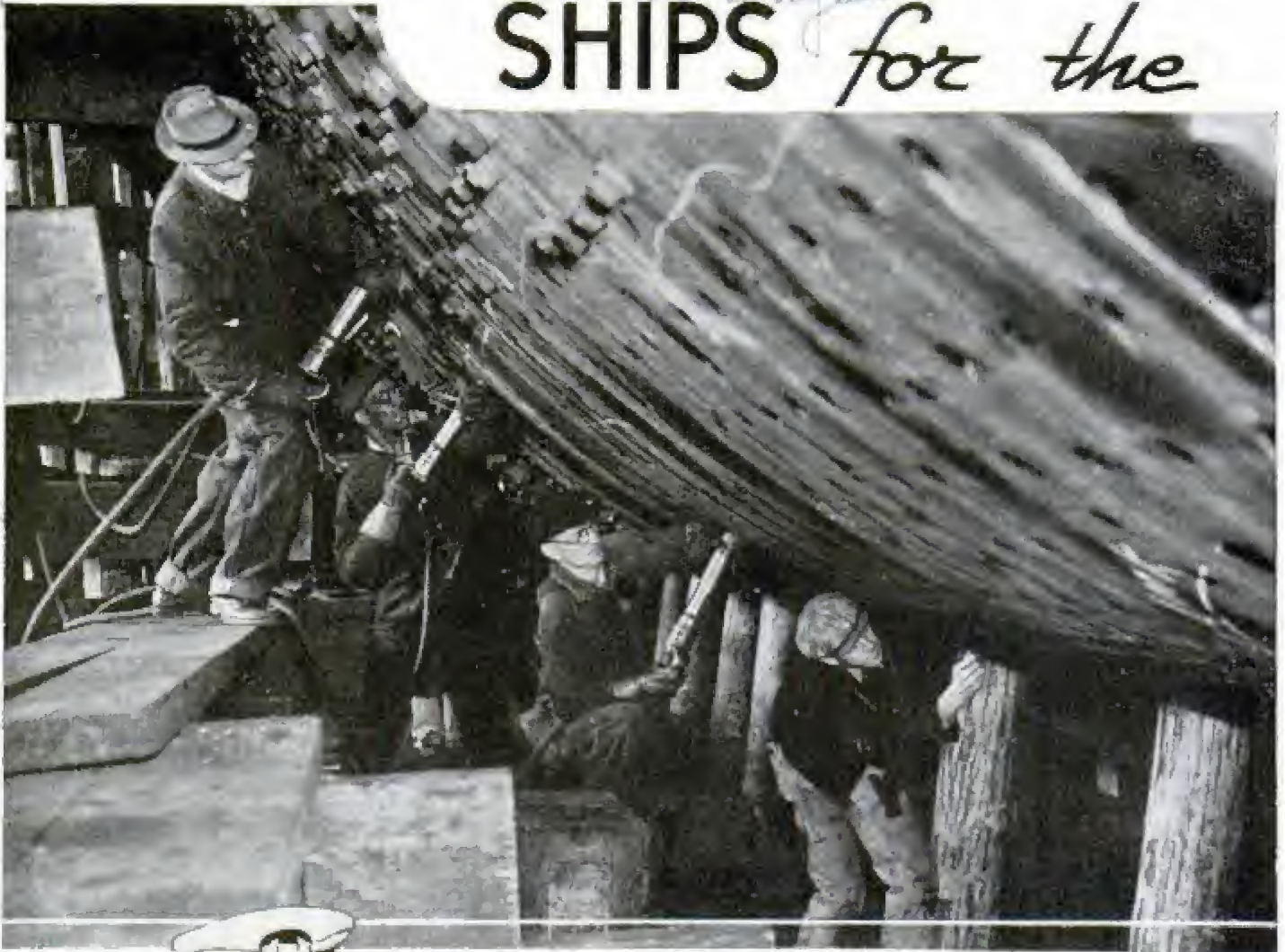
International Harvester Co.,
180 N. Michigan Ave

g 521 1012 Anson St.

W. H. H. H.
Renta 3 milking machine

10 553 Holman Co
Los Angeles

SHIPS for the



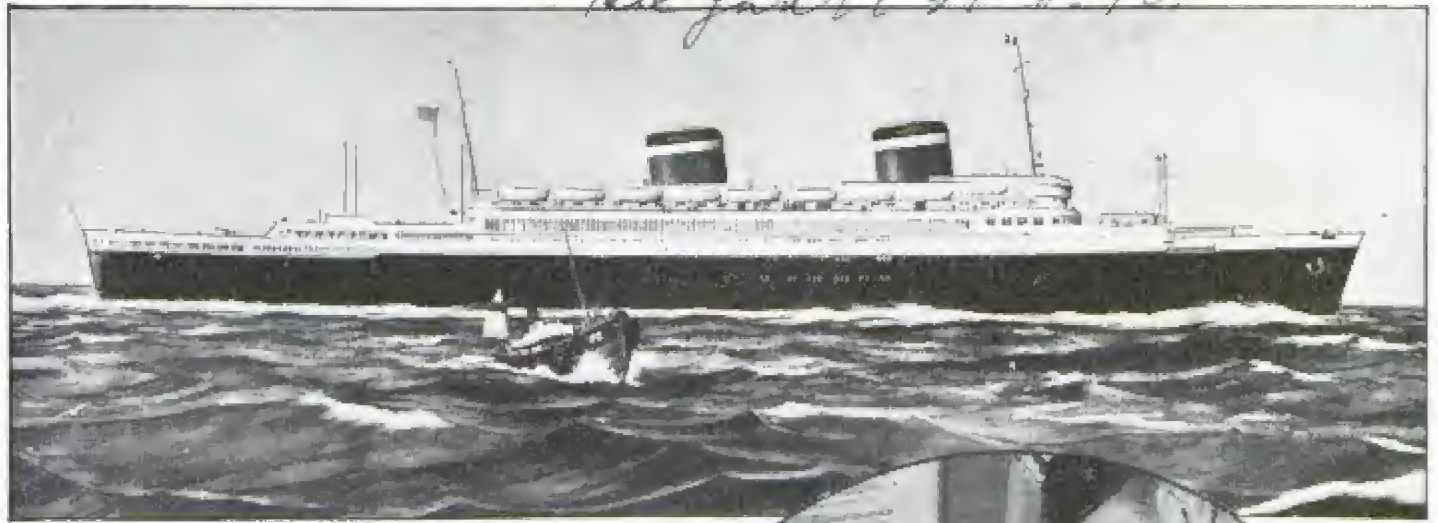
UNCLE SAM is dressing up in a blue uniform coat and a nautical cap to-day, getting ready to go to sea after a long stay ashore.

Shipyards are humming with activity for the first time in twenty years. Big ocean-going vessels at the rate of one or more a month are sliding down to blue water. Seventy-two ships were on the ways at one time in American yards last winter. Fifty ships a year for ten years, or 500 ships in the next decade, are projected for construction. New passenger liners by the score, fleets of sturdy freighters and squadrons of tankers are to be launched.

American shipping has been drifting in a doldrum because it has been more economical to use the vessels left over at the end of the war than to build new ones. Meanwhile other nations have captured much of our normal trade. The merchant fleet lags fourth in ships, sixth in speed, and seventh in age among the eight principal maritime nations. Eighty-five per cent of the war-time tonnage is now obsolete or

Top, remarkable picture of riveters at work on bottom plates of the "America." Bottom, motor that spins gyrocompass on big liner

NEW MERCHANT FLEET



worn out and the present building program is one of replacement rather than expansion. New construction is being co-ordinated by the United States Maritime Commission, which in some cases is buying the new ships in order to sell or lease them to commercial lines.

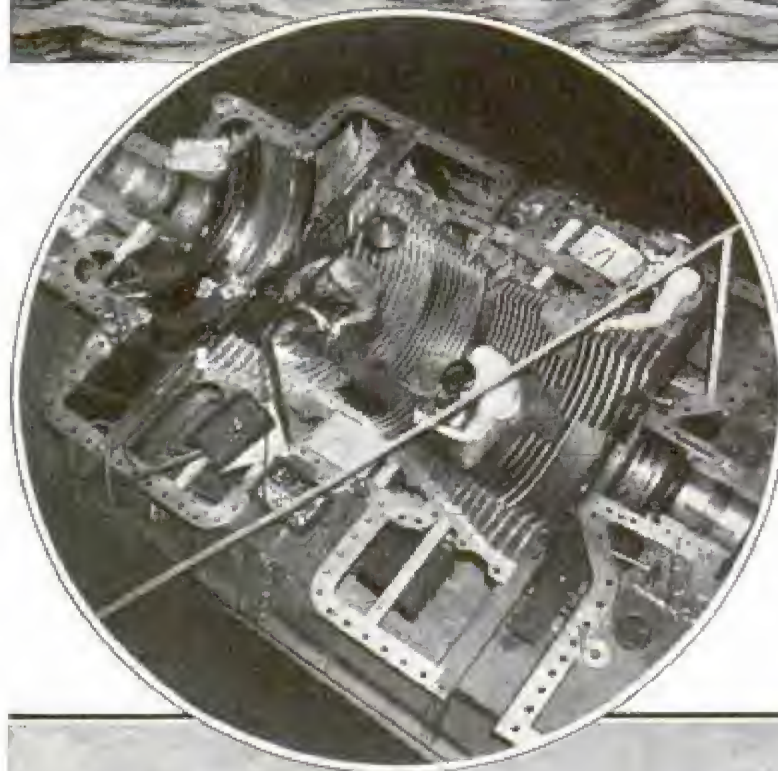
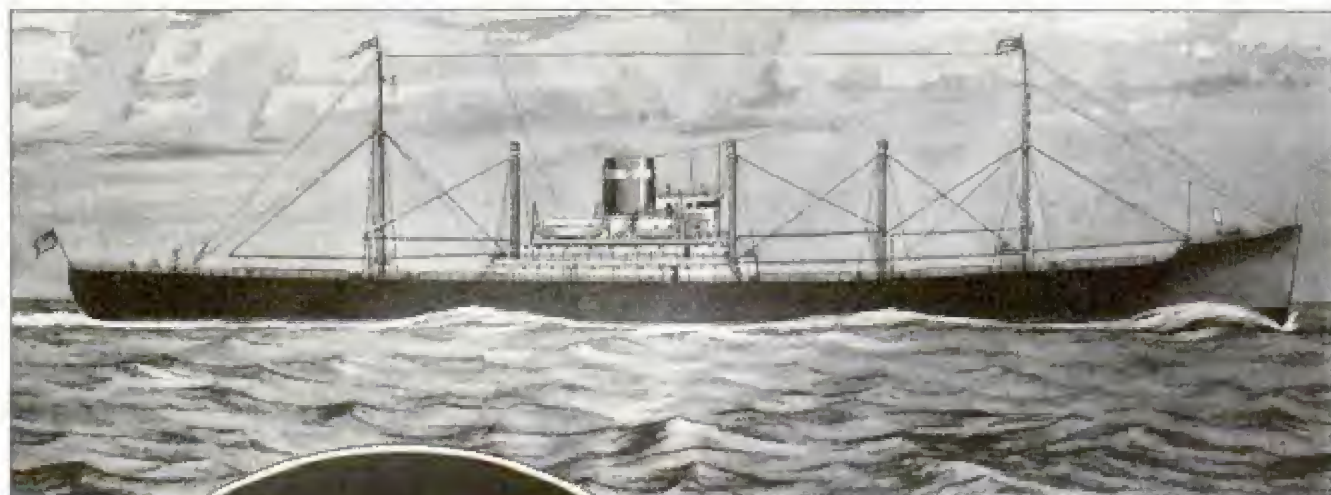
These new ships will increase the efficiency of America's fighting fleet because they are designed for conversion into fast auxiliary naval craft in time of war. To help



Photo courtesy United States Lines

Top, the "America," largest liner ever built in this country. Circle, cadet on bridge adjusting weights representing cargo tonnage. Bottom, fifteen-foot working model of the "America"

Applications Director of Personnel



Top, and bottom, drawings of new cargo vessels which are being built. Circle, skilled mechanics blading low-pressure turbines for the "America's" driving machinery

man the new ships, training schools have been opened up on both coasts. Three thousand merchant seamen and 300 officers each year are receiving technical training that will fit them to serve in the new fleet.

Present flagship of this new armada is the safety liner "America," which is the largest passenger liner ever built in the United States. She is due to enter service in the transatlantic run next spring as companion to the "Washington" and the "Manhat-

tan" of the United States Lines.

The ship is 723 feet long and has a load-draft displacement of 34,000 tons. Her speed is rated at twenty-two knots. The liner will accommodate 1,200 passengers and a crew of 639. Her cost will be \$15,750,000.

The ship has three-compartment stability, which means that any three compartments of the vessel could be flooded in an accident without endangering the ship. All the latest safety devices have been incorporated in the design and the ship is constructed throughout of fire-resistant materials.

Among other new passenger ships, two \$11,000,000 transpacific liners are also to be built.

Steam still rules the waves as far as the big liners are concerned but Diesel propulsion is taking its place alongside steam in the smaller cargo ships. Meanwhile the design of steam power

plants has been changed to make them more efficient. In a large modern steam turbine the superheated steam entering the turbine case is hot enough to set fire to wood, yet when it leaves three-hundredths second later it is cool enough for a comfortable bath. The transfer of energy in the turbine reduces the steam pressure from an initial pressure of possibly 1,200 pounds to the square inch to a vacuum of one-thirtieth of an atmosphere. The pe-

peripheral speed of some of the new large turbines, under the impetus of steam pressure, is about 820 miles per hour, some eighty miles faster than the speed of sound.

One interesting development in Diesel installations is the use of an electromagnetic slip coupling for reducing the vibration and the tremendous torque of the engines, which in the past has necessitated extra large propeller shafts. In this new kind of coupling there is no mechanical connection between the engine and the propeller shaft.

Twenty of the ships under construction, known as the C-2 class, will be standard cargo carriers 435 feet long with a draft of twenty-five feet, of 13,900 tons displacement, and with a cruising radius of 13,000 miles. The C-2 class was developed by the Commission's technical staff with the collaboration of private shipbuilding experts. Each of the vessels is costing some \$2,000,000 and will be suitable for practically any ocean route. They will have a speed of fifteen and one-half knots, making them fifty per cent faster than the majority of American cargo vessels. Carrying a complement of forty-two men, they will be assigned to various trade routes radiating across the Atlantic from North Atlantic ports. Some of them will be put in service between North Atlantic ports and the far east via Panama Canal.

This standard class, as well as the larger C-3 group, contains numerous national defense features such as magazine spaces, gun foundations, heavy-lifting facilities, and other gear that fits the ships for possible service as aircraft and submarine tenders. Both the C-2 and the C-3 types represent a new trend in design, avoiding the tall masts, decks cluttered with handling gear, and the high-bridge structures of the past. Both classes will supply a speedy express service between ports and are designed for fast, efficient cargo handling and long service. The ships will have a neat appearance and will seem to ride low in the water. Both types will have raked stems and cruiser sterns.

With the awarding of contracts for ten C-3 combination passenger and cargo ships the Commission raised to sixteen the total number of hulls in this classification on which work has started. These ships are

(Continued to page 124A)

Washer in a Kitchen Table Needs No Storage Space



Above, out comes wringer when washer is used. Put back top, as below, and it's a handy kitchen table

The problem of storing a full size electric washer in apartments is solved by combining it with a table that gives daily service in the kitchen. Occupying a space twenty-four by forty inches, the machine is complete with wringer and built-in rinse and wash tubs. It is finished in oven-baked white enamel and has a stainless porcelain top which is removable and hangs at the side when the washer is used. Seven and one-half pounds of dry clothes is its capacity. A pump to drain the tubs into the sink can be obtained if desired.

(American women use enough lipstick every year to paint 40,000 barns.)

Dogs Ride in "Normandie's" Dummy Funnel



Top, kennels in the oval funnel have stainless-steel bars and straw beds—changed daily. Below, two voyaging pups try on life preservers. Left, menu for dogs—and it's in French

That dummy funnel on the "Normandie," which is probably a concession to the old popular fancy that the more funnels, the more power, is not entirely a dummy after all. Inside it are recreation rooms, a theater and kennels for the passengers' pets.

The dogs live comfortably aboard ship behind stainless-steel bars that surround their oval room, at the center of which is a drinking fountain. The kennels are steam-heated and ventilated, fresh beds of straw are provided daily, and the dogs are al-

lowed daily exercise on a top deck. There are even life preservers for the pups in large, medium and small sizes, and a special menu printed in French offers choice bones, soups, biscuits and vegetables. In case the canine tourist is indisposed, a veterinarian aboard helps him win back his sea legs.

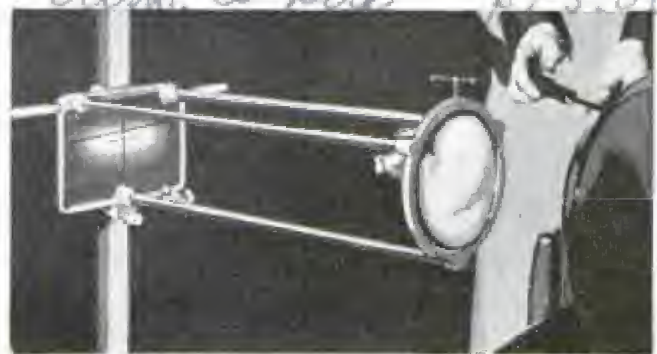
Seal for Milk Bottle Tilts Its Cap to Pour

Fitting any glass milk or cream bottle, a sanitary metal top seals the contents, yet permits easy pouring by slight finger pressure. An arm soldered to the disk grips the lip of the bottle holding it tightly in place. Pressure on this lever raises the cap so liquid can be poured, and when released the lid snaps back into position.



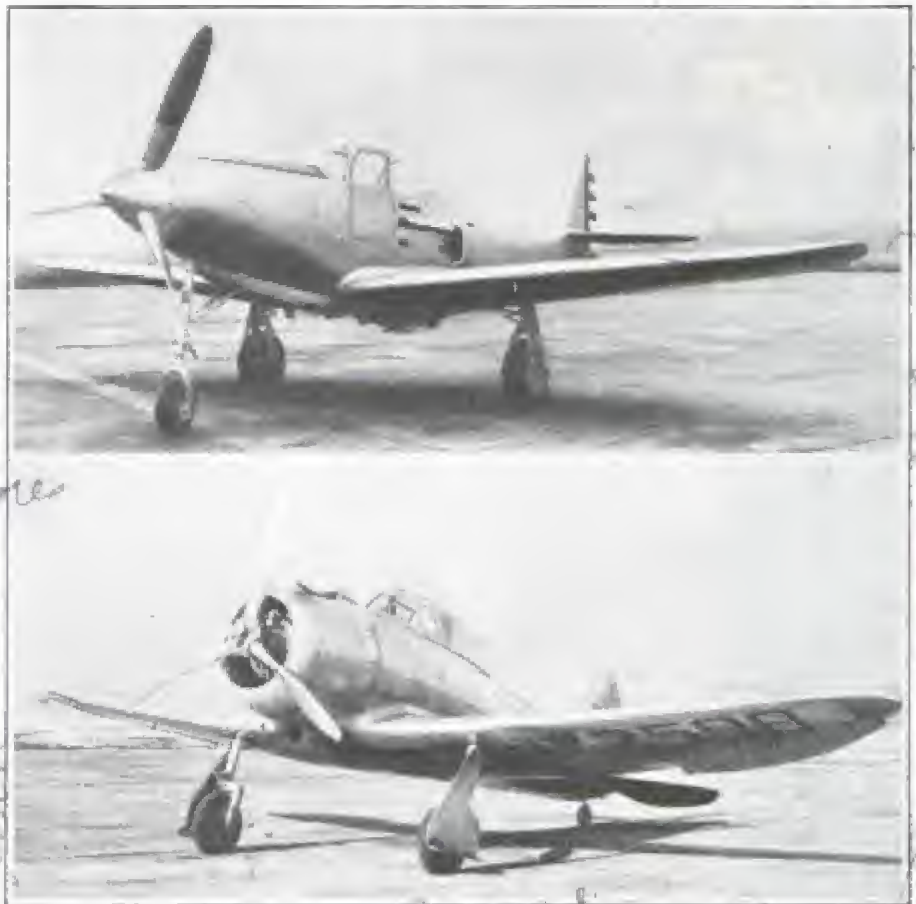
Headlamps Are Focused by Flashing Midget Beam Pattern on Screen

Equipped with a large lens which projects a sharp miniature beam pattern on a screen, a new aiming and focusing device now on the market aids the repairman in the adjustment of headlamps. Crossed lines indicate the proper aim of the beam and a ragged pattern indicates poor focusing. The device is mounted on three casters and may be used anywhere in the automobile repair shop, a space of only four feet in front of the car being necessary.



Beam pattern, on screen at left, aids in focusing

Winged Bullet Pursuit Planes Carry Two Machine Guns



Top, the Bell "XP-39" pursuit plane with retractable tricycle landing gear; below, the Seversky "XP-41." Both are undergoing army trials

If war comes, enemy bombers may find their match in these tiny single-seat pursuit planes being tested by the U. S. army air corps. Their top speed is a closely guarded secret, but airmen believe they will be capable of 400 miles an hour. Each is of all-metal construction and each carries two machine guns. The Bell "XP-39" is powered with a 1,000-horsepower twelve-cylinder Allison engine, while the Seversky "XP-41" has a Pratt and Whitney double-row engine. The Bell ship is twenty-five feet long with a wing span of thirty-five feet, and the Seversky is slightly larger.

Miller Tool & Mfg Co
27 37 1/2 11 11 11 11

DOS and DON'TS

near Palm Spring

The Oregon State College
Left, more and more people are finding the bicycle a handy means of reaching the country for an outing. Below, students on bike outing. Bottom, whizzing around track in six-day race

Los Angeles

Evelyn Knapp and Earl Blackwell film players



ANYONE in good physical condition can learn to be a crack bicycle rider, says Norman A. Hill, who was forced off the race track by an injury after winning the national all-round championship in 1933, 1934 and 1936.

There's much more to riding than the ability to balance yourself and push the pedals, Hill warns in pointing out that training is almost as important, although less strenuous, for the beginner as it is for the racing cyclist.

To get more speed, to operate in safety, to receive the greatest amount of physical benefit and to have the most fun, the beginner should see that his bicycle is in good condition, then follow a few simple rules. Hill suggests:

"The first thing you do is to make sure you have the correct position. Sit on the saddle and place one leg straight down

at Sunset Cliff, Calif.

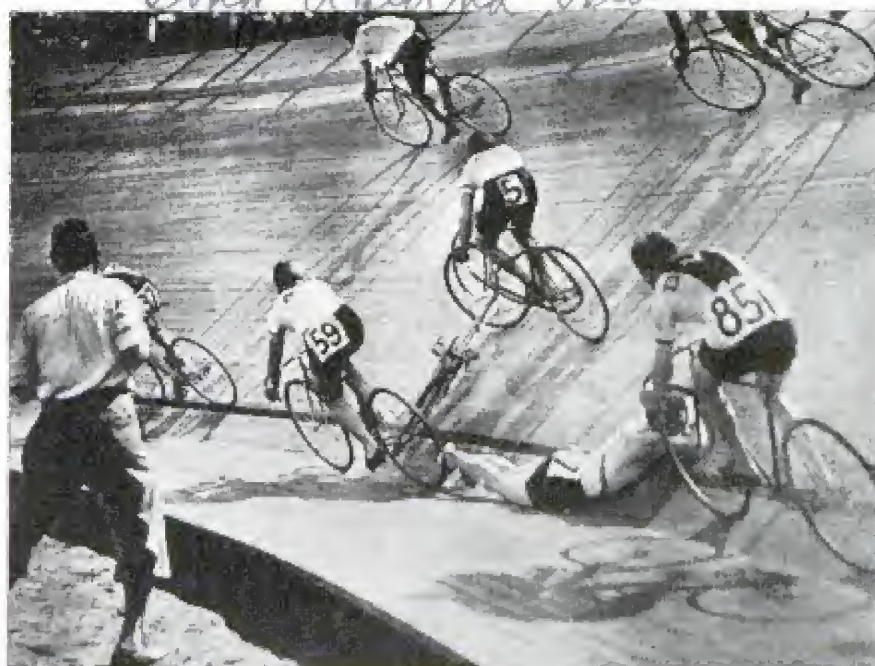


% Cycle Trades of America Channing Bldg 7- 'Cock' O'Brien 4 - Jules Audy

of BICYCLING

with the corresponding pedal at its lowest point, with the heel resting lightly upon the pedal. Then when the ball of the foot is placed on the pedal, a slight bend in the knee will result. Always ride with the ball of the foot on the pedal as it will make riding easier, develop a strong, slender ankle and strengthen the arch.

"Handlebars should be the approximate width of the rider's shoulders. Sit in comfortable position with the body leaning only



slightly forward, avoiding excess strain on the arms.

"The saddle tip is set, depending upon the build of the rider, directly over or a little in back of a line straight up from the cranks when they are in vertical position, or placed so the rider feels that the greatest power can be exerted on the pedals from just after they leave dead center at the top until just after they reach dead center at the bottom. This is the portion of the pedal revolution that allows the rider to use both weight and strength com-



Top, crackup on Brooklyn, N. Y., track. Center, Frank Bartell as he set record speed of 80.58 miles per hour behind pace-setting car. Bottom, park bicycle path constructed for protection of riders from other vehicles

*Rowing Eight
at Putney*



Coach riding bicycle through the water (above) as he directs crew. Left, a bike parking lot. Bottom, looking down on saucer at Madison Square Garden during six-day race. Crowded stands indicate the interest in this sport



bined. For normal riding the rider can rest during the remainder of the revolution. Pedal evenly—rhythm is what counts.

"Keep the legs straight, parallel with the frame, to avoid awkwardness and to get more power into the drive. Keep the tension of the chain even throughout the entire turn of the sprocket and you'll soon achieve smooth, effortless, speedy performance.

"Look straight ahead, holding your head still and the handlebars naturally. Don't let your shoulders wobble or you'll upset the balance.

"You should ride moderately at first, increasing the distance and effort gradually as you become accustomed to the bicycle and your muscles limber up. After riding,

a bath or shower followed by a brisk rub-down with a coarse towel is refreshing and beneficial.

"The diet, for the beginner determined to become a crack rider, should be viewed sensibly. The amount of food required varies with the individual and his occupation. An average adult of 150 pounds needs about 1,600 calories at rest, about 2,500 calories at ordinary activity and about 6,000 at very hard work. An average serving of the common articles of food contains

*Century of Progress
Bicycle Day*

about 100 calories. A varied diet, consisting of milk and milk products, eggs, meat, fish, whole-grain cereals, fruits and vegetables will supply all the essential elements. When weight control is a factor one can increase for a gain, or decrease for a loss of weight, the amount of liquids and concentrated foods consumed, such as sugars, fats, and starches.

"You should ride every day, to gradually attain the best form and to strengthen your muscles. It won't be long before you'll notice a surprising difference in the ease with which you handle the bicycle and in the speed. If you want to achieve exceptional speed, select a certain distance, perhaps one to two miles, and have a friend time you. Rhythmic pedaling in the proper position, plus the daily training run, soon will result in the speed you seek. Just as in other sports, practice is the key to success."

Keeping the bicycle in good condition also is important. The beginner would do well to learn how to clean and oil every part, with the exception of the coaster brake. That should be taken to your dealer or an expert repairman. Each day before you ride, see that the bicycle is clean and oiled, the chain at the proper tension and the handlebars and saddle adjusted and tight.

Once the rider learns how to get real speed, he may want to go further, to become a racer. Anyone from sixteen to twenty, with the correct heart and lung action, can enter the racing game, if he is willing to stick to a strict training schedule. And he can become a consistent winner if he will study his field carefully, as do champions in other sports, and strive constantly to improve his performance.

Many people wonder how the six-day bicycle racer can endure the long grind of these spectacular events. The secret, says Hill, is training—the never-ending routine necessary to keep the body fit and the muscles supple. Some race riders, such as Torchie Peden, can go through a strenuous schedule, perhaps eight to ten races in the winter, without ill effects, simply because they adhere closely to the training routine the year 'round. And it pays good dividends, because some riders make \$500 and up per day during the races and because they can keep in competition until they are

(Continued to page 116A)

Camp Table Forms a Case to Carry Four Chairs



Above, table will seat four for games or luncheon. Folded, as below, it's a case and carries its chairs

When folded for carrying to a picnic, a camp table forms its own handy case which also incloses the four stools belonging to the set. A patented catch on each of the four seats locks the top and legs together in open position, so the chair will stand solidly without danger of collapsing.

Thermostatic control of the oil-burning range oven is made possible by a unit, just introduced, which regulates oil flow to keep the desired temperature.

Automatic Products Co.

2540 N 32nd

Donald J. Canger 4204 N. Milwaukee Portland, Oregon

THERE'S NO PLACE LIKE

Touching light fixture and faucet invites electrocution, left. Below, keep electric cords from children and be sure they bear safety tag of Underwriters' Laboratories. Right, reproducing accident in which gasoline vapor flowed downstairs to be set off by fire in yard



By
Roderick M. Grant

MAKING gravy, you'd say, is a pretty safe occupation. One housewife will tell you it's mighty dangerous; she was painfully burned by a flour explosion over her skillet. Another woman was careless with bleaching powder and set the house afire. Still another learned disastrously that it's not safe to clean clothes with gasoline, even in open air.

It all adds up to the fact that you're living

in a very dangerous place. More people were killed in their homes last year than died on all the streets and highways. Four times as many were injured.

Ram your automobile at seventy miles an hour into the broad side of a freight car and you smash right into the front page, with pictures. Trip over a carelessly parked roller skate on the basement stairs and they give you a three-line obituary

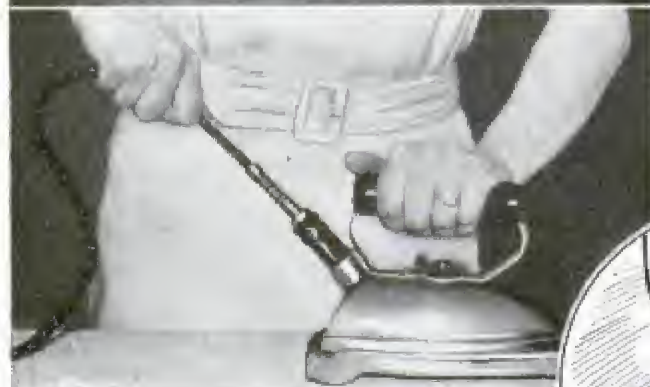
HOME - for ACCIDENTS

By replacing burnt-out fuse with a penny and overloading circuit, demonstrator sets afire model home at Chicago's Rosenwald Museum. Below, pictorial proof that stairways are no place for mops and buckets



back in the classified section. Death on the highway is spectacular. Death in the kitchen or the front hall is not so newsy, but just as permanent. And a lot more frequent.

There ought to be a law to protect you in your home. Let one crazy driver hurtle through a bridge railing and you find legislatures and city councils and safety commissions and highway engineers formulating new laws and designing safer roads to end accidents forever. But your house is your castle at your own risk, and no legislator is going to introduce an act regulating the indoor parking of roller skates, enforcing the tacking of loose rugs and forbidding you to set the house on fire by sticking a penny in place of the burnt-out fuse when the lights go out. You'll have to be your own inspector and policeman.



Maybe you think we're overrating the perils of home life in America. Well, look at the figures. Life was a lot safer in many ways during 1938. Fewer people died in airplane and railroad wrecks. Deaths in automobile crashes decreased. Fatal accidents at work dropped under the 1937 total. Home accidents alone jumped higher. There were 32,500 persons fatally injured right at home—500 more than the national total of traffic deaths. Non-fatal injuries were even more alarming. On the streets, 1,100,000 people disabled, temporarily or permanently; at home, 4,750,000—about one in every twenty-seven persons in the United States!

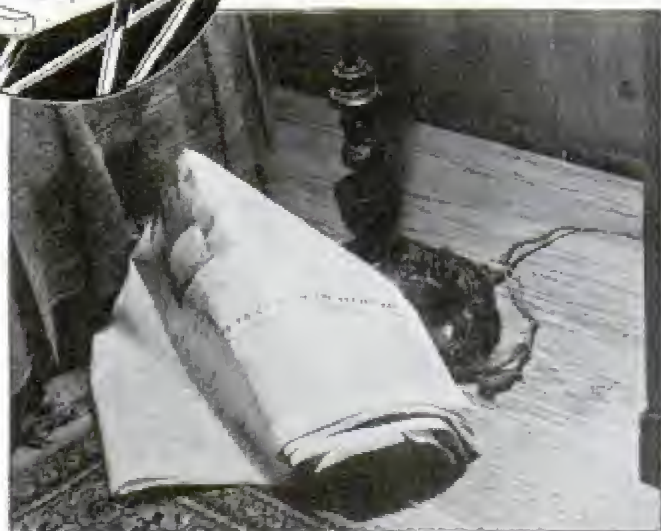
Well, what are these lurking perils? What can you do about them?

Stairs and steps are the most dangerous places. Twenty-three per cent of the accidents occur there. Nineteen per cent happen in the yard. Your kitchen is your deadliest room, site of eighteen per cent of home mishaps. Living room, porch, bedroom and basement follow in order.

If accidents came where you expected them, they wouldn't happen. But you would never suspect the gravy of being an explosive. Stirring her mixture in a skillet on the kitchen stove, a housewife picked up the flour sifter to add thickening. As the cloud of flour descended there was an explosive flash and she leaped back screaming, her face and hands painfully burned. The concentration of flour and air had been just right for a dust explosion touched off by the flames licking up around the skillet.

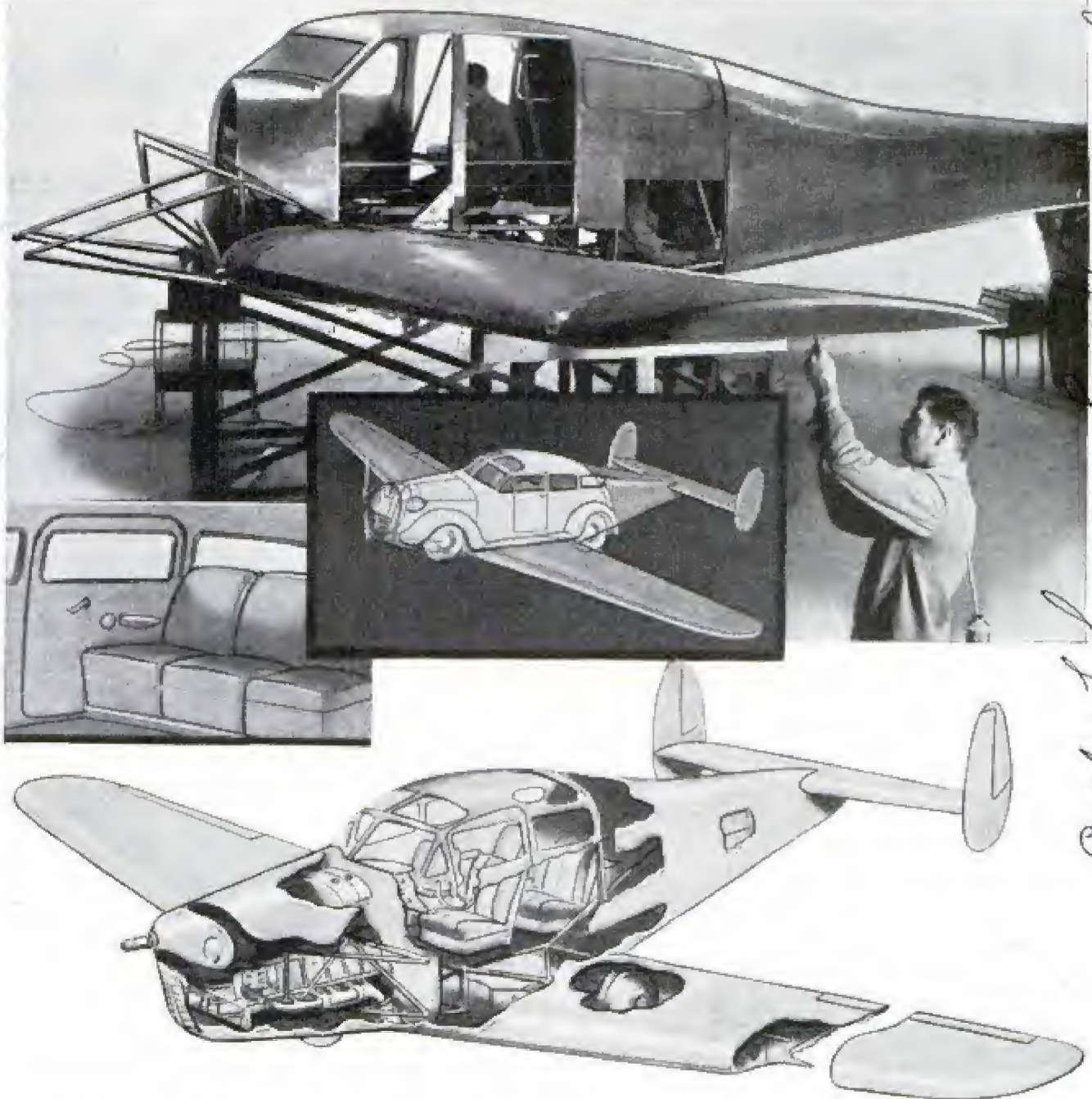
Nor would you suspect the hidden perils of ordinary household bleaching powder—sodium peroxide. A dramatic reenactment of what happened in one home is given in a fire-prevention demonstration by an insurance company. A small amount of the powder is mixed in a bowl of sawdust. Water is added, and in a moment the contents of the bowl blaze up fiercely. The same thing might happen if the bleaching powder were spilled on a wooden floor, ground in, then became moist. But it's so rare you'd never be looking for it.

Gasoline, of course, is a
(Continued to page 120A)



Here's how not to do it. Don't invite a crack-up—use a stepladder. Don't yank the wire, pull the plug. Don't forget to disconnect the iron. And don't toss paper near a wire with frayed insulation

'Auto with Wings' Gives Comforts of Motoring



Top, mechanics assembling first Vega airplane. Center, sketch shows how designers adapted pattern of auto to fuselage, and, left, three-place rear seat. Cutaway drawing of construction details, bottom

True automobile comfort has been the aim in designing the new Vega airplane which contains seats for the pilot and four passengers like those found in the average motorcar. A roomy rear seat holds three persons without crowding, since it is more than sixty inches wide at the elbows. In the front part of the ship the pilot's seat is divided to hold one extra passenger, and this part is entered directly from a door on the pilot's side of the all-metal body. As in an automobile another full size door gives access to the rear. Other interior

equipment and trimmings help to carry out the idea of automotive styling. Luggage can be stowed conveniently in a rear compartment. Twin Menasco engines supplying 520 horsepower to a single propeller give the plane a maximum speed of 210 miles per hour at 7,500 feet, and it will cruise with one-half power at 160 miles an hour. Carrying 100 gallons of fuel the ship has a cruising range of 600 miles. It is a low-wing monoplane having tricycle landing gear with knee-acting retraction. Large windows permit clear vision.

Cond. Thomas & Thompson Jr.
 10555 Hollywood Blvd
 Los Angeles

New York 614 Chrysler
 Phone 135 1st St. Belle

Race Horse Likes Mirror Better than Mascot



Turning from live mascots, this race horse depends on his mirrored image to bring luck on the track

"Feng," a four-year-old race horse owned by Hunter Lyon of Chicago, likes his own reflection in a looking glass better than the company of a live mascot. So, instead of hiring a goat or cat, Mr. Lyon has installed a plate-glass mirror in the stable.

Teakettle Ejects Electric Plug If Water Boils Away

The instinct of self-preservation is "built in" an electric teakettle just put on the



Before this "plug-in" teakettle can boil dry it will automatically eject the electric plug

market. It cannot be damaged by boiling dry. The kettle has an immersion type heating unit and plugs in on the house electric circuit. When the water boils too low for safety, it automatically expels the electric plug and thus cuts the current. The kettle holds four quarts.

Shower Bath Inside the Chimney Stops Soot and Fly Ash

Tons of soot and fly ash escape from the smokestacks of large cities, blackening houses, soiling clothes, drifting into windows. Much of this smoke nuisance could be eliminated by a chimney "shower bath" invented by a Cincinnati engineer. A perforated brass ring is placed inside the stack above the outlet of the boiler breeching, and whenever the fireman blows the boiler tubes to clean them of soot deposits, water is turned into the ring. The spray wets

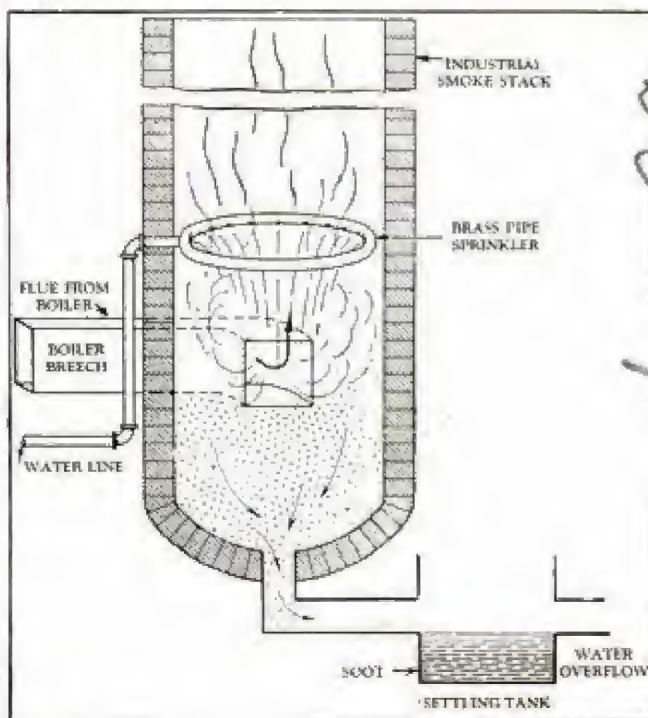


Diagram of chimney shows how spray washes soot into settling tank when boiler tubes are blown

down the soot particles in the stack; cinders and fly ash are carried by the stream to the bottom of the stack and thence to a settling tank from which they are later removed to a cinder pile.

Inquiries as to makers of articles described in Popular Mechanics, will be answered by our Bureau of Information upon receipt of return postage.



The CRAFTSMAN

DRESSING TABLES

from packing crates

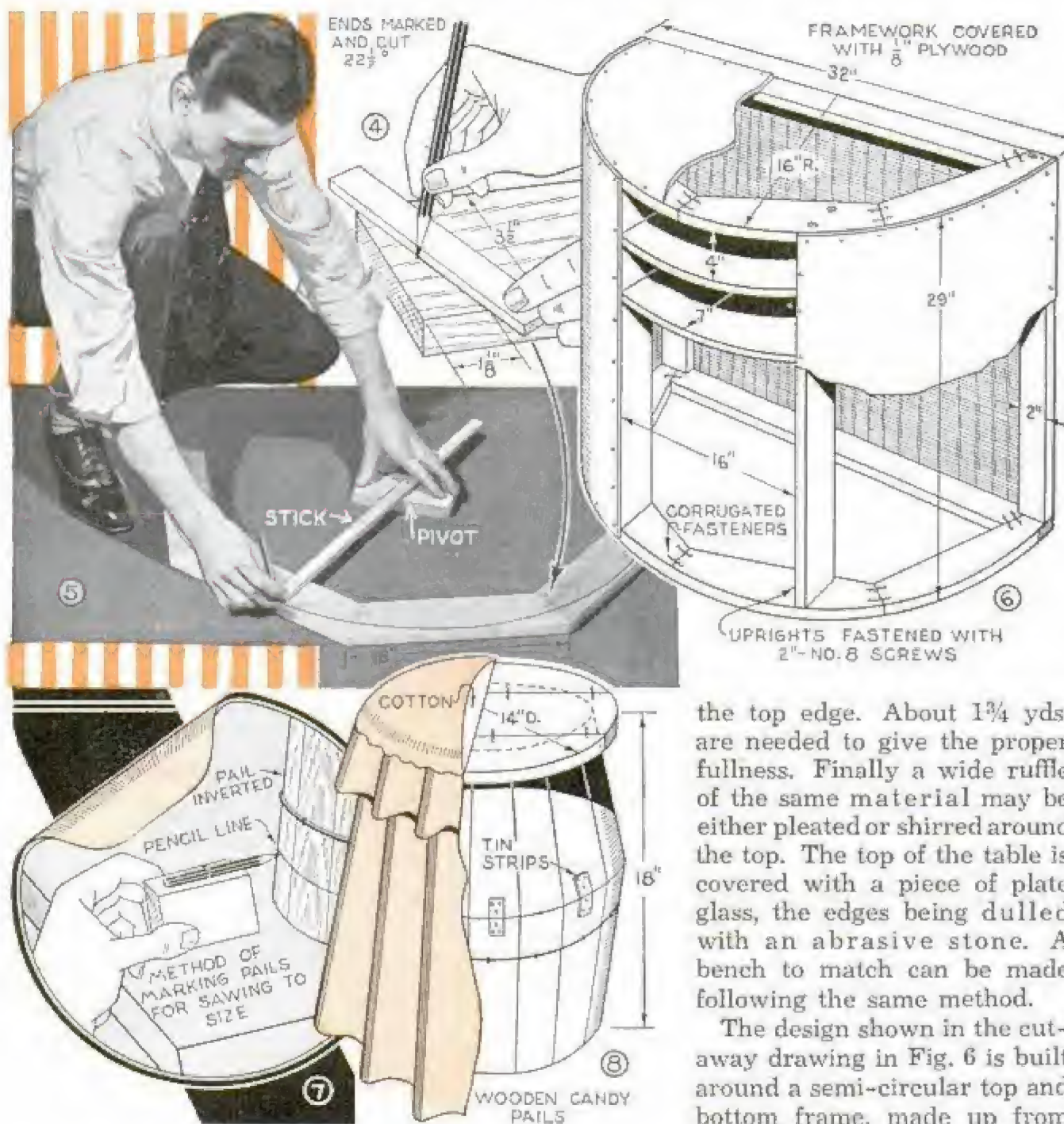
Two simple styles built from box lumber — also a candy-pail stool. All tailored with neat "skirts" of colorful fabric

By WAYNE C. LECKEY

THIN plywood from a discarded refrigerator crate, and solid stock from packing boxes provide enough material for the framework of these two vanities shown in Figs. 1, 3 and 6. The work consists of building a lightweight yet solid framework of scrap stock over which a colorful, cloth skirt is tacked. Besides nails, corrugated fasteners are used as in Fig. 2 for assembling most of the plain butt joints. You can drive these in place easily by laying the work on the basement floor and tapping with a hammer.

To make the frame, assembly and dimensions of which are shown in Fig. 3, first rip the stock into strips about 2 in. wide, unless the wood is already this width. Assemble the two end units as shown, fitting a cross rail between to support the shelves, and then join the two with front and back rails, butted and nailed with 2½-in. No. 8 casing nails. A shelf with a short compartment under it, is made up separately and then fitted to the frame. The shelf has a narrow retaining strip





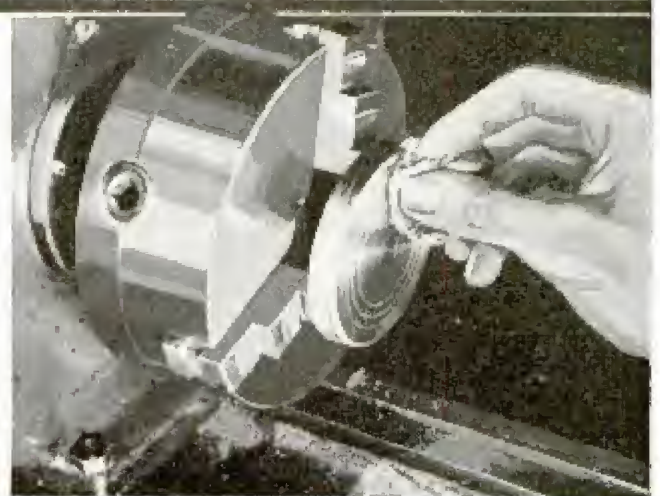
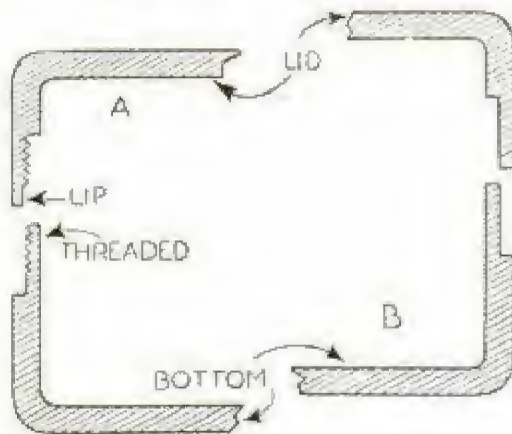
nailed to the back edge while the compartment is backed with a strip of plywood. Thin plywood from a large crate provides the covering for the back, sides and top of the frame, using $\frac{3}{4}$ -in. flat-head nails to attach it. Fig. 1 shows how the skirt is ruffled for pleasing appearance. It is parted at the center for access to the shelf and compartment. A covering of colored fabric of the desired shade is first made full in box form to cover the top, sides and front of the frame, tacking this along the back edge and with a tack or two at the part in the front. Next, over the sides and front of this an outer covering of white dotted swiss or similar material is sewed around

the top edge. About $1\frac{3}{4}$ yds. are needed to give the proper fullness. Finally a wide ruffle of the same material may be either pleated or shirred around the top. The top of the table is covered with a piece of plate glass, the edges being dulled with an abrasive stone. A bench to match can be made following the same method.

The design shown in the cut-away drawing in Fig. 6 is built around a semi-circular top and bottom frame, made up from four 18-in. segments. The ends of these are marked at an angle as in Fig. 4 after which they are joined together with corrugated fasteners. Be sure to keep them at least $1\frac{1}{4}$ in. in from the edge so that they will not interfere in curving the edge. After fitting a strip along the back edge, a 16-in. radius is drawn, using a stick and pin as in Fig. 5, and the work is then cut round by first sawing off the corners and planing down to line. The assembled framework is covered with plywood.

Fig. 8 details an attractive bench made from two wooden candy pails. Each pail is marked as in Fig. 7 and cut down so that when both are placed together they will form a stool about 18 in. high.

Auto Pistons Turned into Novel Powder Box



Machined heads of two discarded aluminum-alloy pistons form this attractive powder box. First, you cut off the heads of the pistons just below the ring grooves with a hacksaw. Then finish the inside and run off the ring grooves up to the chuck jaws. Reverse the work, finish the balance of the edge and cut down the top end until the center hole is removed entirely. Cut the ornamental V-grooves as indicated.

Now you have your choice of two joints between the halves, A and B in the detail. The slip joint, B, should be a close, sliding fit while the threaded joint, A, must be free so that the halves will turn together easily. This means some care in setting up the job. Final finish on both halves consists of a thorough polishing with fine steel wool and then covering immediately with a coat of transparent metal lacquer.

Wall Sprayed to Loosen Paper without Wetting the Floor

The usually messy job of removing old wallpaper is simplified by spraying it with water to soften the paste. Very little if any water will drop on the floor, and none of it will run down your arms, especially when wetting the ceiling paper. Use warm water, and apply it with a small hand or insect sprayer.

—V. Robinson, St. Paul, Minn.

☐ Standard pieces of cork tile, available in 9 and 12-in. squares $\frac{3}{16}$ in. thick, serve nicely as hot pads for table use.



Carpenter's Damaged Square Trued with a Hammer



After dropping a steel square, which bent the metal slightly out of true, a carpenter repaired it in a few minutes by placing the corner of the square on a steel block and hammering to expand the metal. This brought the edge to a 90° angle.

Round "Saw" Cuts Neat Holes in Plaster

When installing light fixtures and other electrical fittings, a round outlet box with the edges serrated provides a good tool for



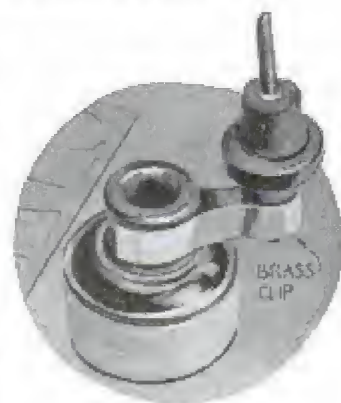
cutting neat holes in plaster quickly. A handle shaped from flat iron permits the box to be turned from side to side to exert a "sawing" action.

—Jack Snodgrass, Fairmont, W. Va.

Drawing-Ink Bottle Has Clip to Take Loose Cork

If the quill on the cork of a drawing-ink bottle is not used and the bottle must be kept open while lettering or writing with an ordinary pen, there is no need to lay the cork on the table or on your work, which may result in an ink stain. Just bend a narrow strip of brass double and spread it to fit the bottle neck and to take the cork. A length of wire could be substituted for the brass strip if desired.

—Burl Knutson, Bismarck, N. D.



File for Strip Photo Negatives



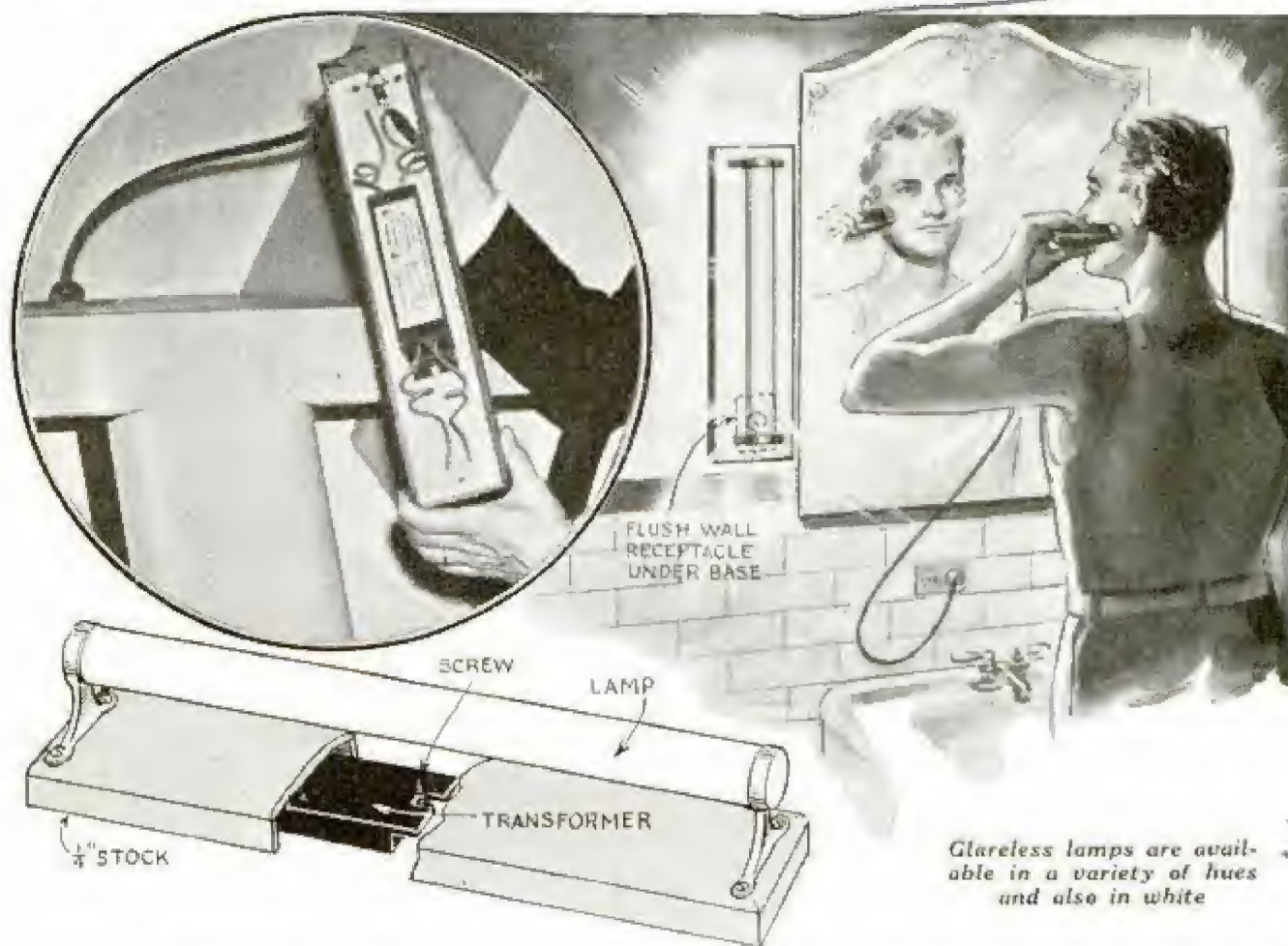
An economical method of storing strips of small photo negatives has been found in the use of an old book, or better, a dummy obtained from a publishing company. The pages are joined together in twos at the edges, preferably

with rubber cement. By cutting slits at the top of the page, two strips of negatives can be slipped into the pockets thus formed. The names and numbers of the respective pictures can be written on the page to provide a handy index.

—Victor W. Macy, Lisbon, Portugal.

¶ You can prevent leaves of a book from crinkling when water is accidentally spilled on them if you put the wet pages, one by one, between two blotters and iron first one side and then the other.

Portable Wall Units for Fluorescent Lamps



Glareless lamps are available in a variety of hues and also in white

Any craftsman can make wall and ceiling fixtures for the new fluorescent lamps which operate on 110-volt alternating current through medium of transformers. The application shown above is for a bathroom, the lamp, transformer and a small toggle switch being mounted on a base which in this case was made of $\frac{1}{4}$ -in. stock. When

the base is hung directly over a flush wall outlet, no connecting cord will be visible. Fluorescent lamps provide glareless light at a fraction of the operating cost of regular filament lamps that give an equal amount of illumination. They can be had in various sizes and each one must be connected to a special transformer to match its size.

Garment Hangers Spaced on Clothesline by Garden Hose

To keep cleaned or laundered garments apart so they will dry when put on coat hangers and hung on a clothesline, slit a length of discarded garden hose along one side and slip it over the line. Notches cut in the top surface of the hose to take the hanger hooks prevent the hangers from sliding on the line.

❑ If your alligator or lizard-skin handbag is beginning to look worn and shabby, rub it well with a little vaseline to which a few drops of glycerin have been added. Then wipe and polish the bag thoroughly with a clean, dry cloth.

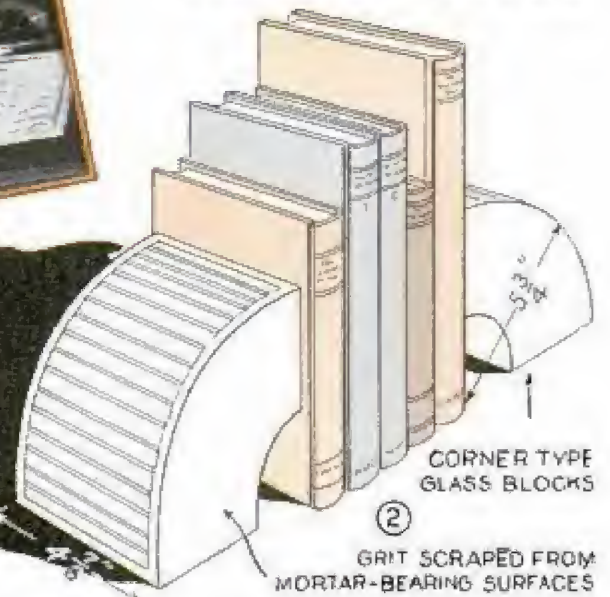
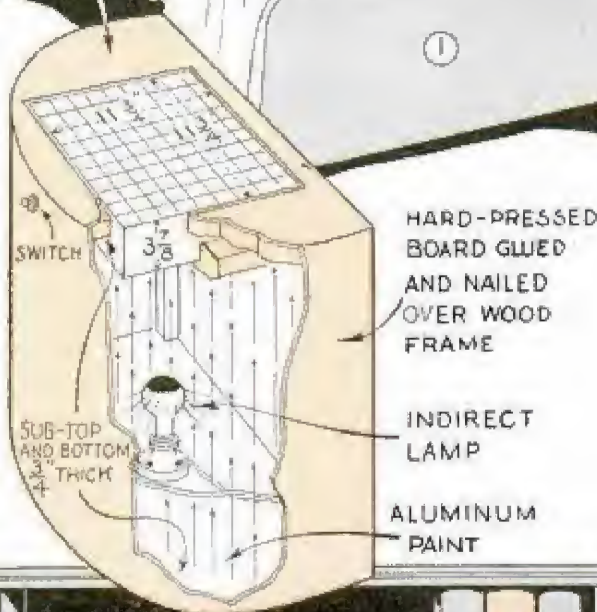
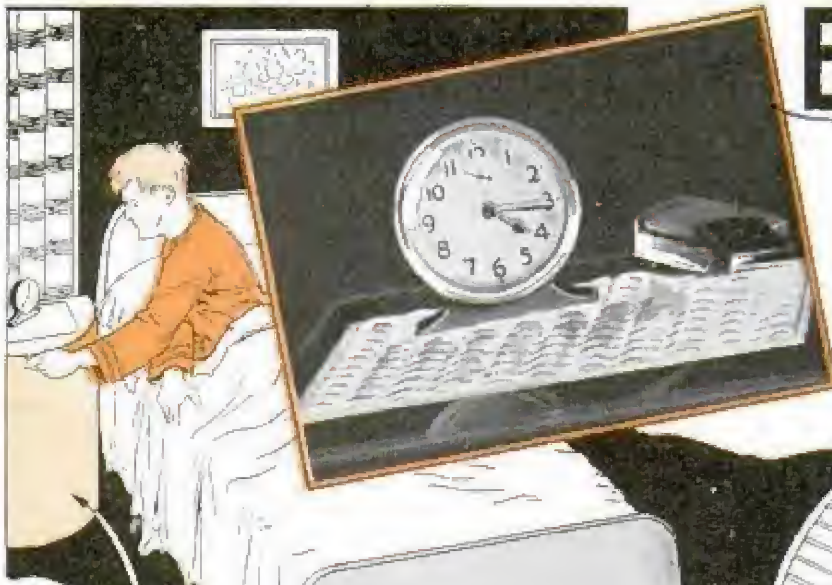


jobbers only. The Walworth Co.
 Waltham, Mass.
 Shureware etc

Owens-Illinois Glass Co. Toledo, Ohio

BLOCKS

make novel

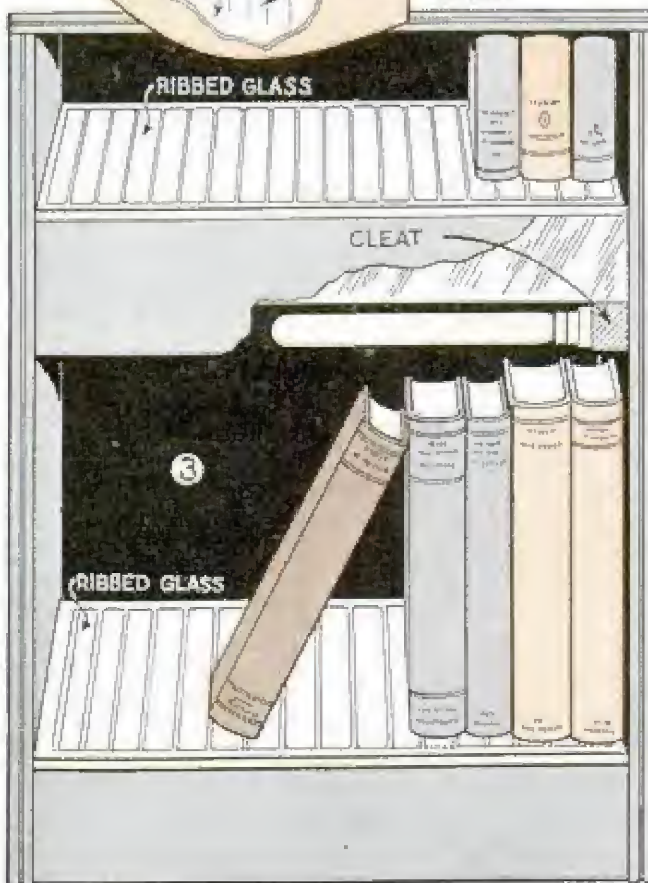


By J. MODROCH

ILLUMINATED book shelves, night stands and attractive light fixtures are just a few novel and practical uses for glass blocks. For example, take the glass-top bedside stand shown in Fig. 1. Just snap the switch on and the face of your clock is illuminated clearly. Looking at the cut-away view which gives the details of construction, you will see readily why and how. Light from the indirect lamp is reflected from the aluminum-painted bottom of the cabinet through the glass block. Diffusion of the reflected light gives a soft glow enabling you to see the time easily without disturbing others. By duplicating the bedside stand you can make a pair of distinctive end tables for your davenport.

You don't "make" the bookends, Fig. 2, because they're already made. You simply buy two curved blocks of the dimensions indicated, scrape the grit from the flat faces and glue a piece of 1/16-in. felt to the bottom of each block.

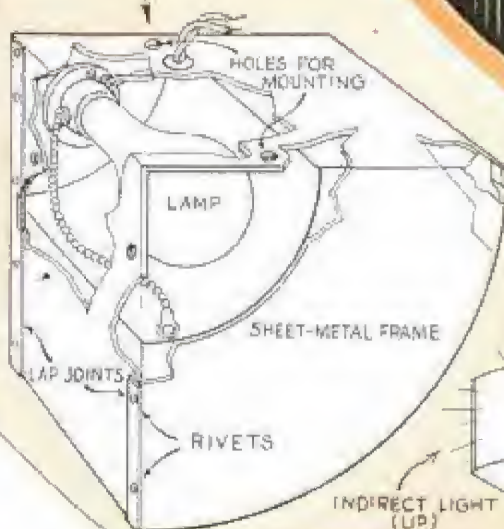
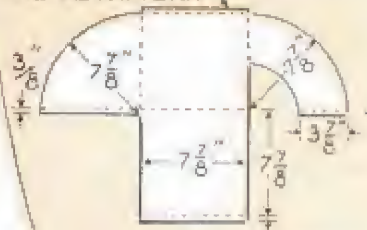
Book shelves of glass blocks are another innovation. They are easy to keep clean, too, and the books won't slip or fall due to the ribbed surface. Fig. 3 shows one arrangement for a small bookcase. Each shelf is illuminated from the underside by a showcase lamp. Wide facing strips of wood cover the edge of the block and the lamp.



of GLASS home decorations

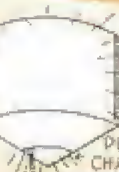
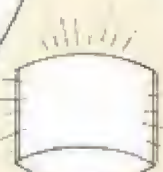
CEILING
LIGHT

METAL PATTERN



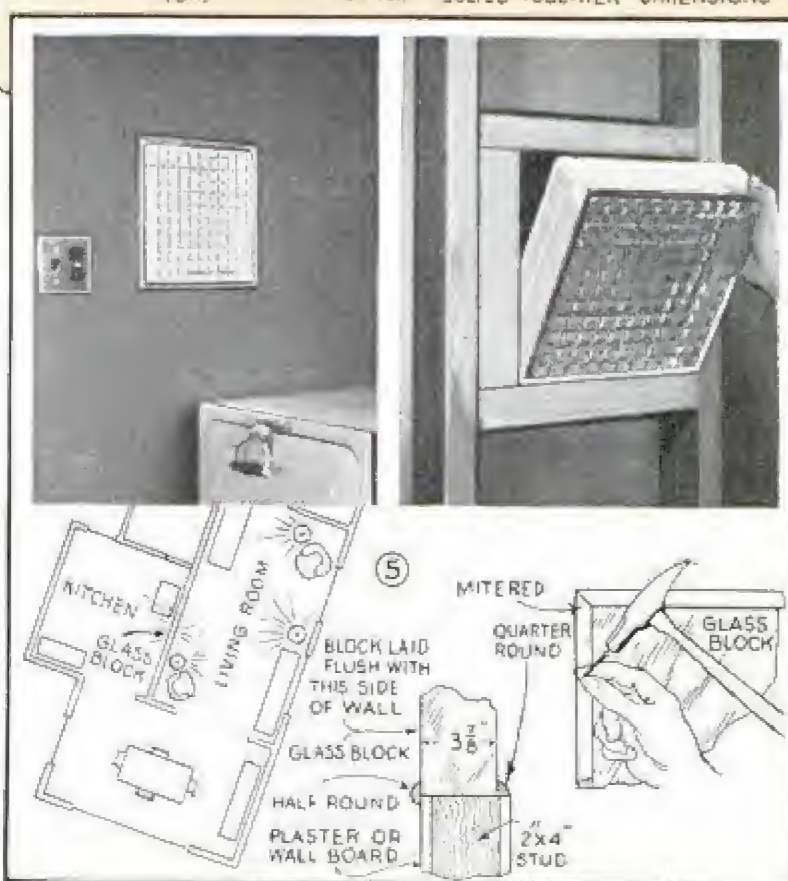
INDIRECT
LIGHT
(UP)

INDIRECT
LIGHT
(DOWN)



TWO UNITS
BOLTED TOGETHER

RECOMMENDED
DIMENSIONS



Details in Fig. 4 show how curved blocks can be worked into ceiling, wall and corner light fixtures for modernized rooms. Finally, when you want a soft light in a kitchen, pantry or closet you can install a glass block in the wall as in Fig. 5 and borrow light from the next room. A single large block will help but a window consisting of several blocks may be desired. Framing it in place is not at all difficult for you can put headers between the studs easily and then fill the opening to the required size with uprights. Note that the block is placed flush with the wall on one side and this is usually best on the exposed face. Molding finishes the job neatly.

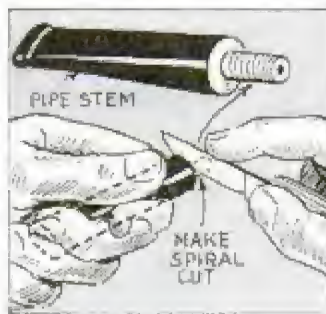
Picnic Dishes Wear 'Dunce Caps' to Keep Out Insects



These paper caps will keep flying insects out of open food containers when you spread a picnic lunch. To make them, roll sheets of newspaper into cones of convenient size and fasten them with pins.

Tightening Loose Pipe Stems

When a pipe stem becomes loose in the bowl because of frequent removal for cleaning, I roughen the small end of the stem so that it fits snugly again. This is done by making a spiral cut with a sharp knife blade.—Glen Blanch, Minneapolis, Minn.



Keeping Finger Marks Off Film



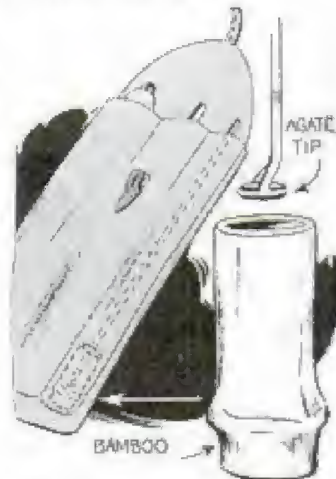
Finger marks can be kept off film when cutting it or when loading holders, by putting small pieces of adhesive tape over the finger and thumb. A coating of fingernail polish will serve the same

purpose but does not provide as good a grip as the adhesive tape.

—Kenneth Murray, Colon, Mich.

Fishing-Rod Tip Is Protected by Piece of Bamboo

One fisherman protected the agate tip of his fishing rod when carrying it in a cloth case, by cutting a piece of bamboo to slip over the tip. This was pushed down in the case so that the tip of the rod would slip into it.



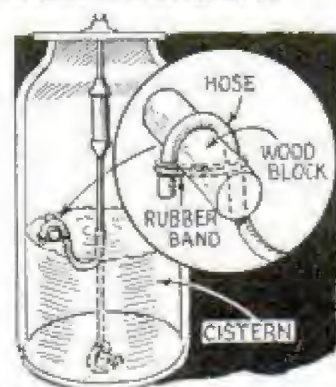
Longer Life of Rubber Bands in Model Planes

Continued breaking of rubber bands used to power model planes may be traced often to the propeller shaft or the rear hook in the tail of the plane to which the rubber band is attached. Small piano wire is used for this purpose and the sharp edges cut the rubber. By slipping short lengths of rubber tubing over these hooks and lubricating the rubber band with glycerin its life will be increased greatly.

—Robert Palenscar, Philadelphia, Pa.

Pump Intake Floated on Water in Cistern Avoids Sediment

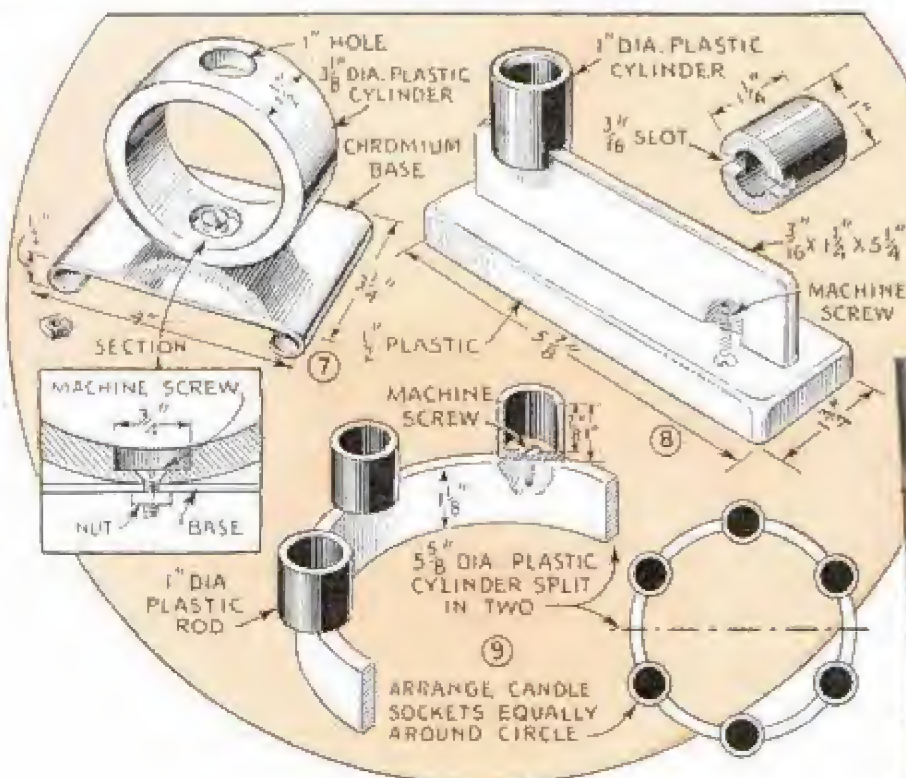
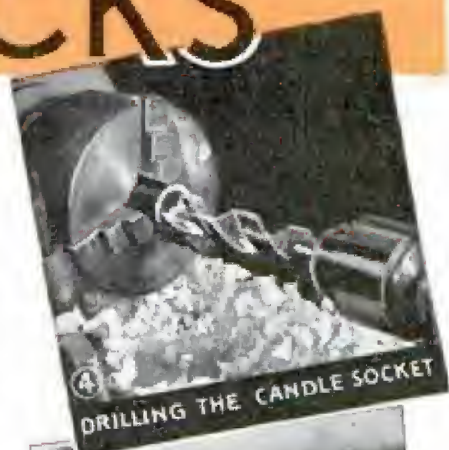
To avoid pumping up sediment from the bottom of a cistern, float the suction pipe on the water. This can be done by cutting off the pump pipe below the cylinder and attaching a length of hose tightly to the end. The suction end of the hose can be attached to a wood block, which will float on the surface, yet will always be in the water regardless of its height in the cistern.





Plastic CANDLESTICKS

APPROPRIATE on smart tables, these colorful modern candlesticks are assembled from standard pieces of sheet, rod and tube plastic. The style shown in Figs. 1 and 7 has a chromium base and a plastic ring drilled on opposite sides to take a candle. The model shown in Figs. 2 and 8 is pleasing because of its simplicity. Figs. 4 and 5 show how the sockets are bored to size. Crescent-shaped bases, each carrying a trio of candles, Figs. 3 and 9, are particularly effective. Slotting, Fig. 6, can be done with a hacksaw and file if you have no motorized equipment.

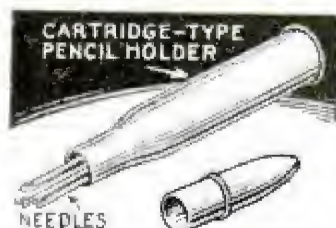


Extra Fishhooks Are Carried in Slip-On Eraser



To carry small fishhooks where they will be handy at all times, slip the barb points under a pencil eraser of the slip-on type. When clipped to your pocket, the pencil holds the hooks safely.

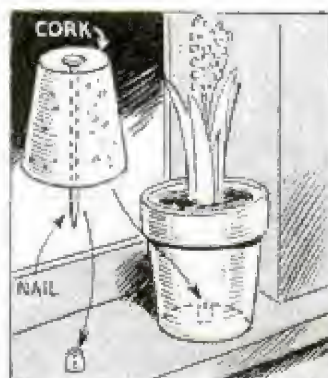
Camper Keeps Supply of Needles in Cartridge Pencil Holder



Campers and hikers will find that a cartridge-type pencil holder is a good container for needles and pins. Also, the holder can be used for toothpicks, small fishhooks and the like.

Corks Anchor Potted Flowers

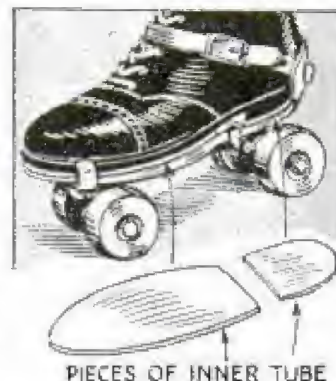
If potted flowers are set on the ledge outside a window to get air and sun, there is less possibility of them blowing off if they are anchored with small corks, which project into the drain



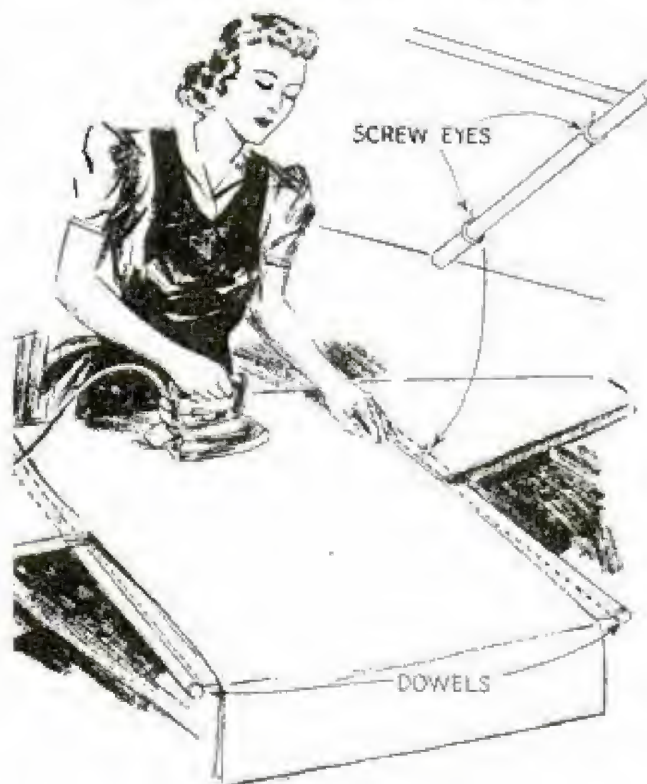
holes of the pots. The corks are fastened to the ledge with long, slender nails.

"Shock Absorbers" for Skates

Much of the jar on your feet when roller-skating over rough concrete will be absorbed by these rubber "inner soles," which are nothing more than pieces of inner tube cut to the shape of your shoe sole and heel. The rubber is cemented to the skates, and can consist of one or more layers as desired.



Cloth Extension on Ironing Board Supports Large Work



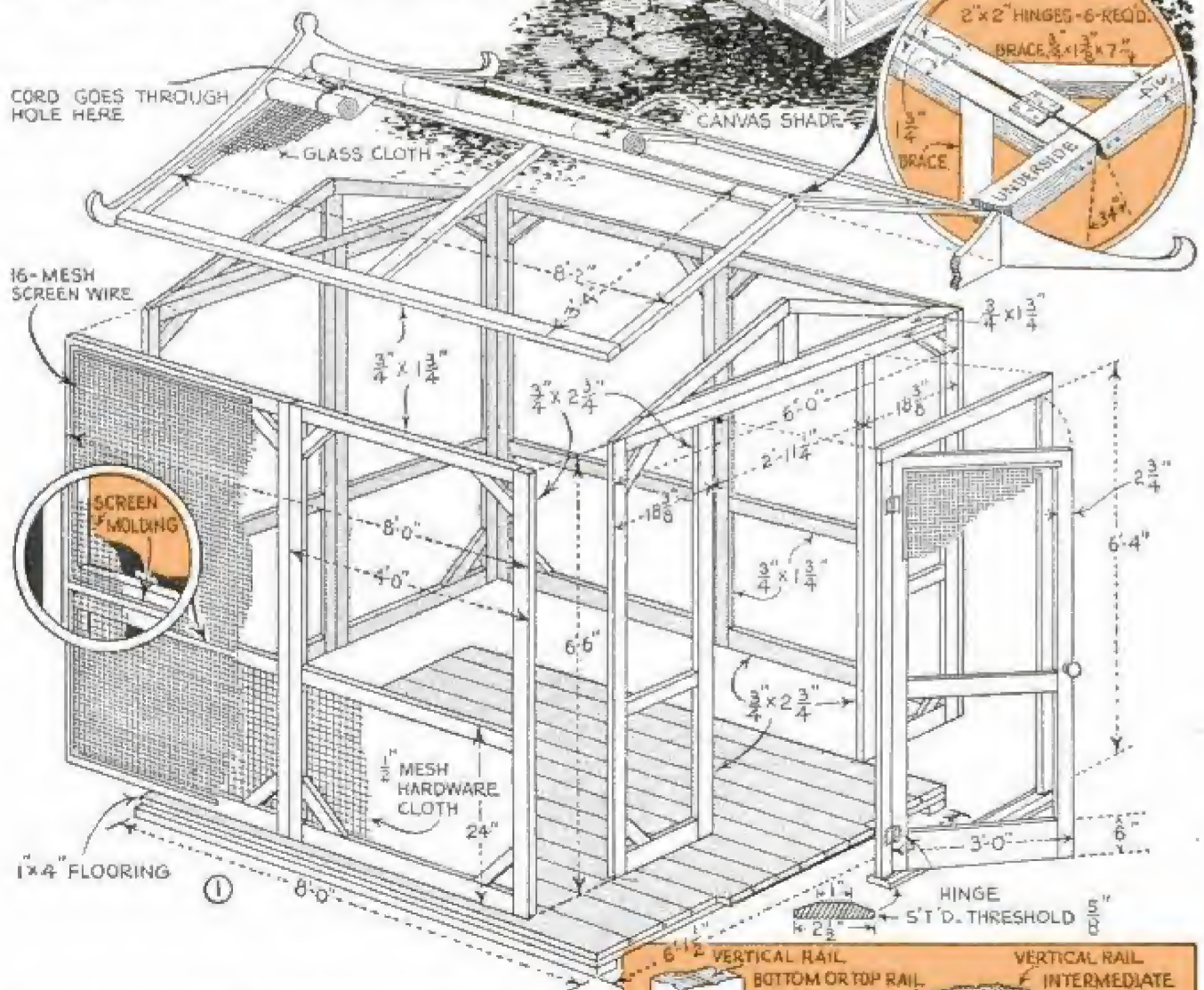
Instead of spreading paper on the floor to prevent long pieces of laundered work from becoming soiled, attach this simple extension on your ironing board. It consists of two stout, wooden dowels, which are inserted into the hems of a wide strip of muslin, the projecting ends of the dowels being slipped into screw eyes underneath the ironing board. When not in use, the extension can be stored out of the way.

Portable Screened "PORCH" in the GARDEN

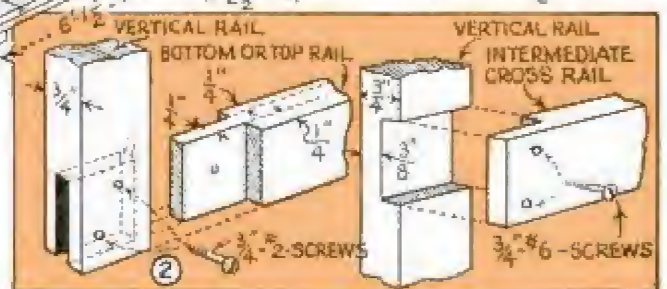
Open-air retreat excludes flies and mosquitoes yet provides shelter from light rains and too much sun

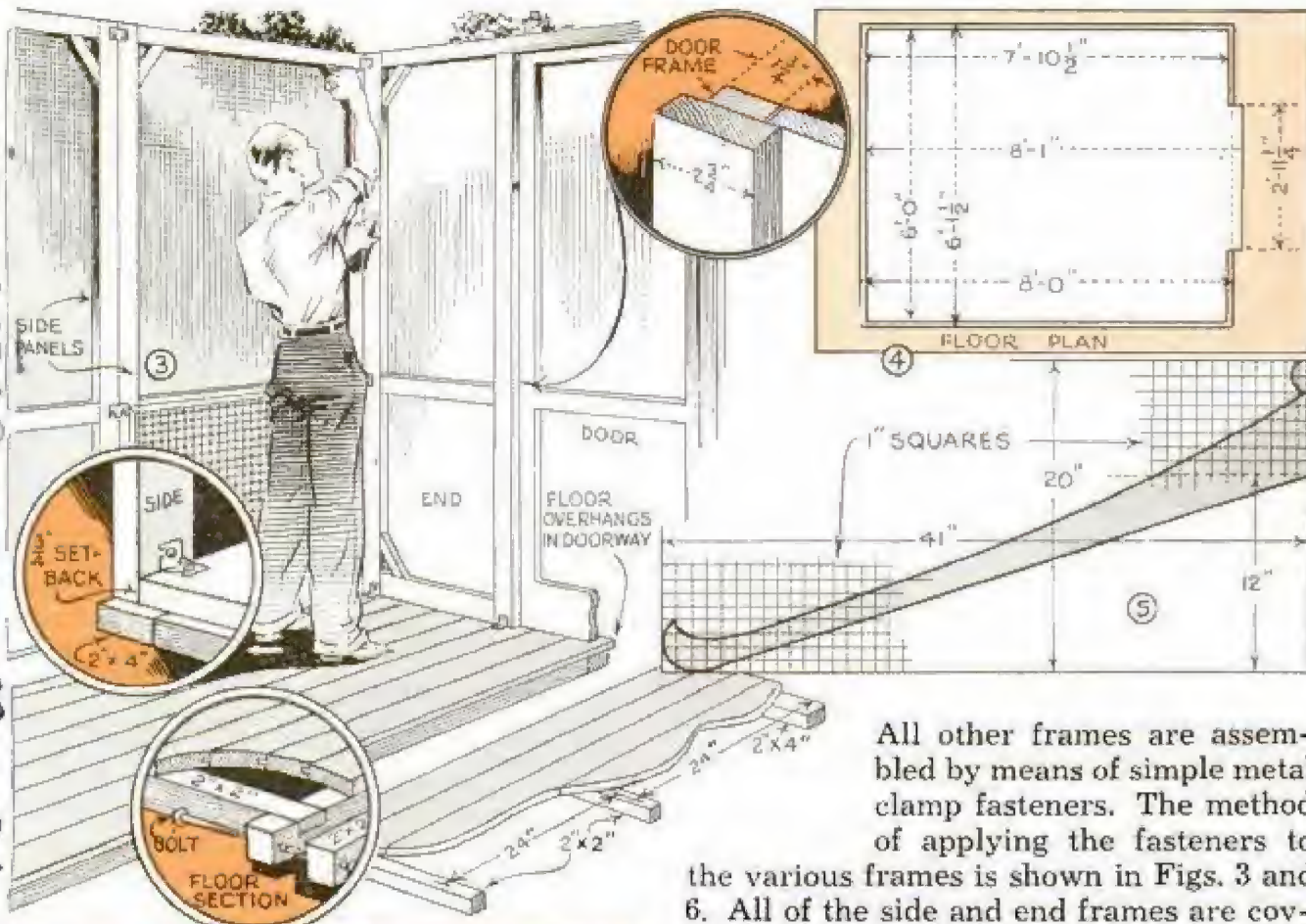
LARGE enough for a cot and two camp chairs, or a card table and four small chairs, this "porch" is the place to spend warm days and evenings in the garden.

Standard screen-frame material is used for all of the frames, Fig. 1, which are assembled with simple joints, Fig. 2. These can be cut with



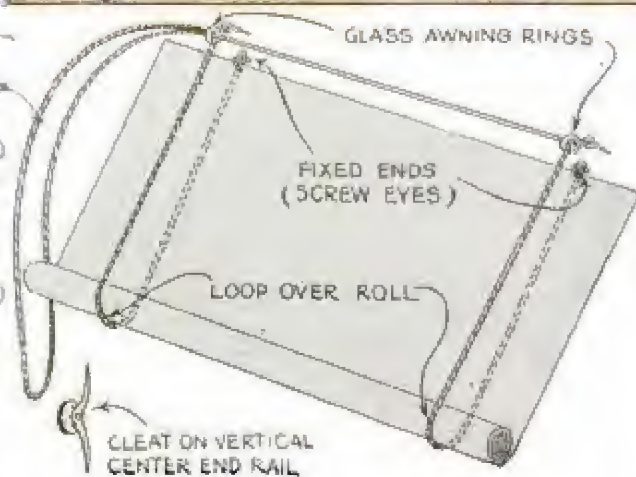
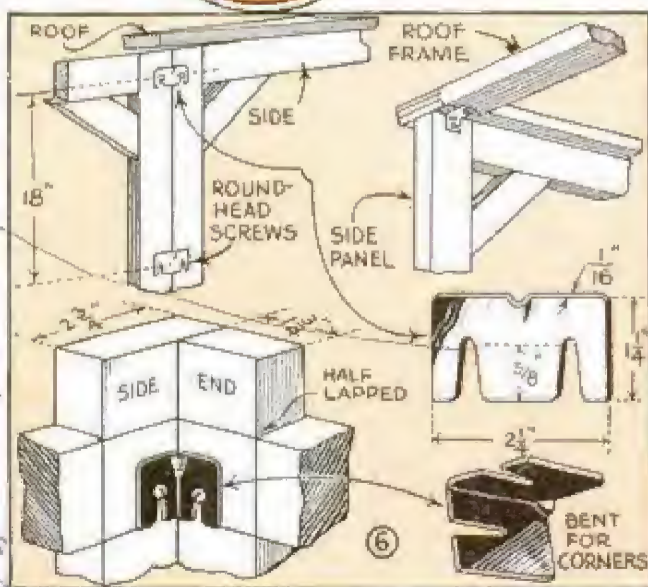
a hand saw and bit and brace. The frames are reinforced with diagonal corner braces toenailed into place or you can get metal corner braces for this purpose. The frames that form the roof are beveled and hinged to fold flat against each other when stored.





All other frames are assembled by means of simple metal clamp fasteners. The method of applying the fasteners to the various frames is shown in Figs. 3 and 6. All of the side and end frames are covered with screen wire on the outside and the edges are neatly bound with screen molding. The roof is covered with clear "glass cloth." This material admits the health-giving ultraviolet rays of the sun but sheds rain. For complete protection against the sun during the heat of the day, canvas curtains may be provided. These should be large enough to cover the roof and side walls. Arrangement of the ropes to adjust the shades from within the structure is shown in the detail below Fig. 6.

Ornamental facing strips, Fig. 5, for the ends of the roof add an Oriental touch to the structure. Fig. 4 gives the plan of the floor, which consists of a platform made in two sections for convenience in handling and storing. A frame of 2 by 4-in. material with 2 by 2-in. cross members, is jointed and assembled as shown in Fig. 3. Over this frame a floor of any soft-wood matched lumber is laid, allowing a set-back all around, with the exception of the doorway, to house the frames. Bolts are used to assemble the two sections of the platform. The framing around the door is doubled for rigidity and to provide jambs. The outer door frame, which carries the threshold, is screwed to the screen frames, the threshold ends being cut away to fit.



Tin Can Supports Toy Ladle on Gas Stove

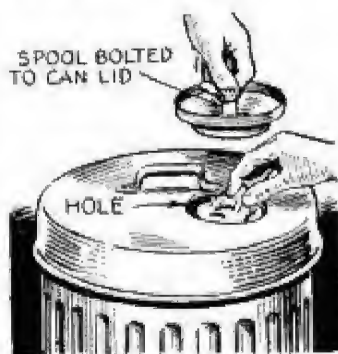


When using a toy casting outfit, difficulty of holding the ladle over a flame can be eliminated by simply cutting a tin can as shown to support the ladle. One of the tin strips resulting from the cuts can be turned upward and a V-notch cut in the end to support the ladle handle, the remaining strips bent as indicated to serve as a base.

Garbage-Can Lid Has Opening to Insert Small Packages

Difficulty of removing and replacing the large cover of a garbage can caused one householder to cut a small hole in the lid large enough to receive the average waste pieces.

To close this opening, the cover from a tin can of a size to fit it snugly was used. An empty thread spool attached to the center of the small cover with a long stove bolt served as a handle.



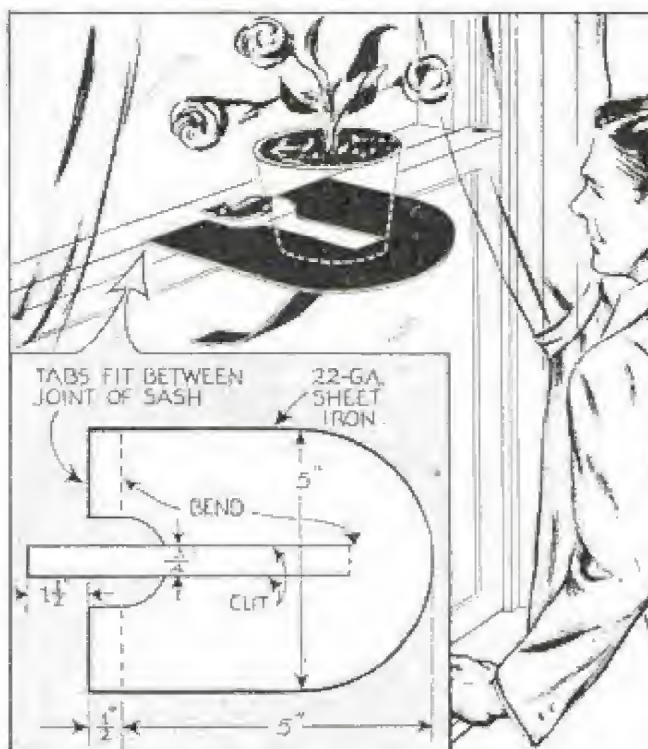
Spring Fork Grips Small Staples to Drive Them Easily



After a staple has been started, the fork is withdrawn before driving it down.

Small staples used for attaching screen wire and similar materials can be held easily to drive them with this fork. It is nothing more than a length of spring wire bent to the shape shown. After a staple has been started, the fork is withdrawn before driving it down.

Flower Shelf Hooks over Sash to Hold Plant in Window



Fitted between the sash of a window that is seldom opened, this shelf requires no fastening and will support a small potted plant. It consists of a single piece of sheet metal cut as shown in the detail. The narrow strip thus formed is bent down to brace the shelf against the pane. The rear edge of the metal is cut out to fit around the window lock, and is bent down to form tabs, which slip between the sash.

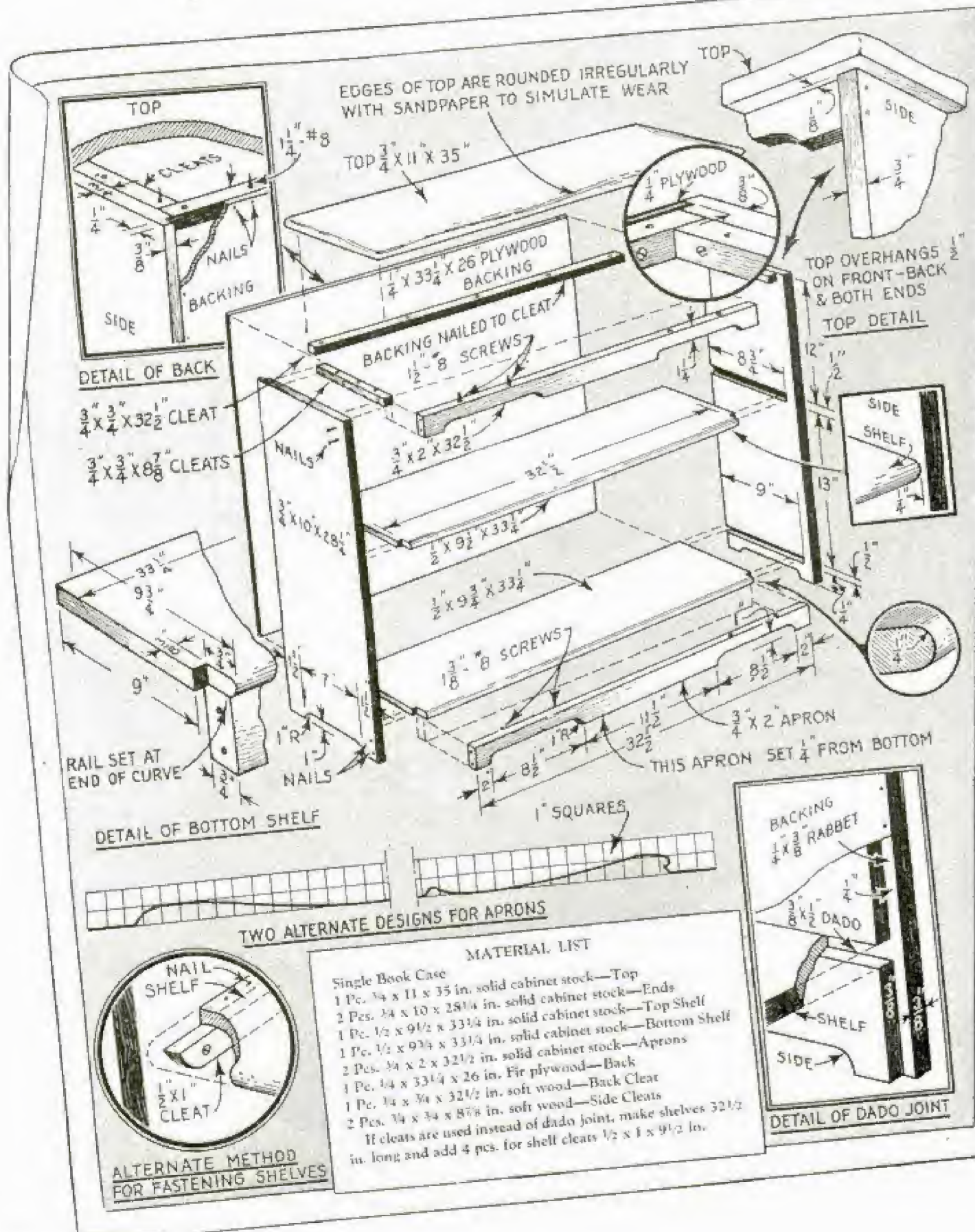
Calcium Chloride Dries Boots

Fill a couple of tobacco sacks with calcium chloride and drop one in each boot. The chemical, which can be obtained at any drug store, will absorb moisture from the boots and they will be dry when you put them on again.

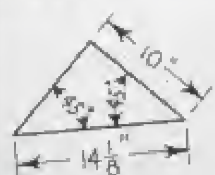


❑ You can prevent white silk from turning yellow while ironing it if you use a warm iron on the wrong side of the silk, protecting it with a piece of coarse cheesecloth.

Knotty-Pine BOOKCASE

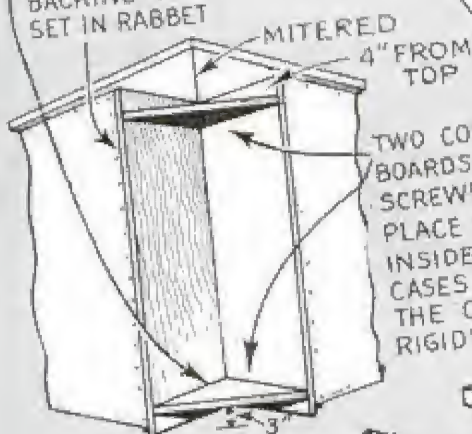


fits in a corner

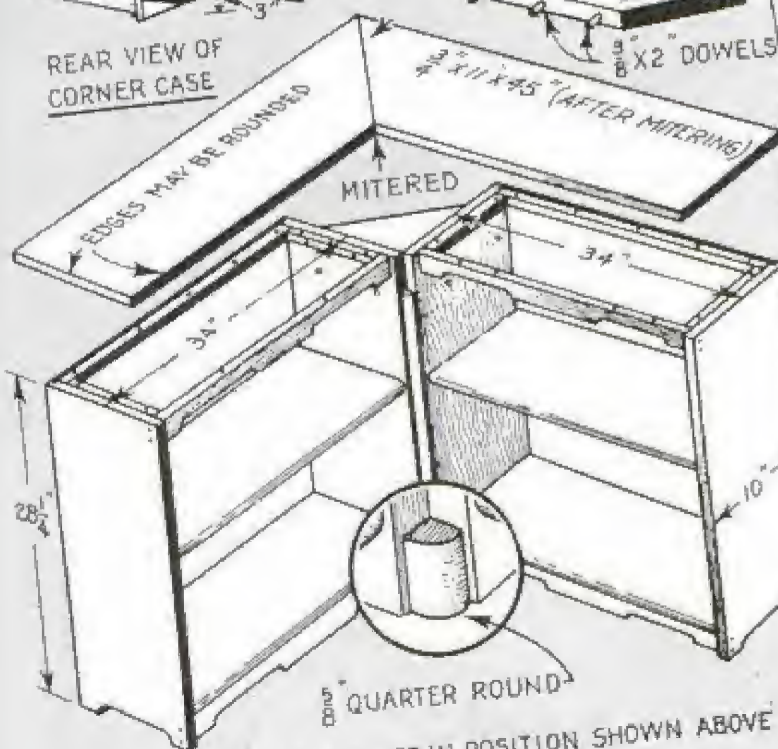


CORNER BOARD

BACKING IS SET IN RABBET



REAR VIEW OF CORNER CASE

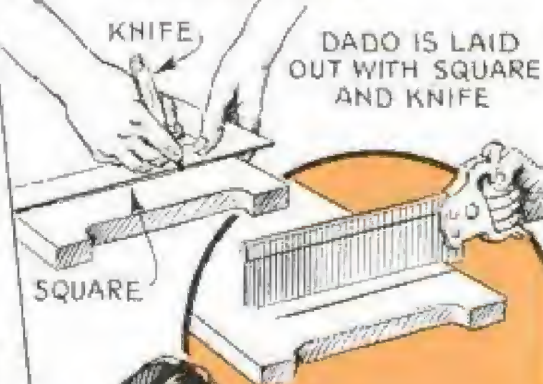


TWO IDENTICAL CASES ARE SET IN POSITION SHOWN ABOVE TO FORM CORNER CASE

Here's the bookcase for that room in knotty pine, furnished in colonial style. Or, if the wood is painted instead of finished in natural color, the design is also appropriate in modern settings. Placed near an easy chair, you can always have your favorite books within arm's reach. Another application is to combine two of these cases in a bare corner, joining them with triangular blocks and a mitered top



STEPS IN CUTTING DADOS WITH HAND TOOLS

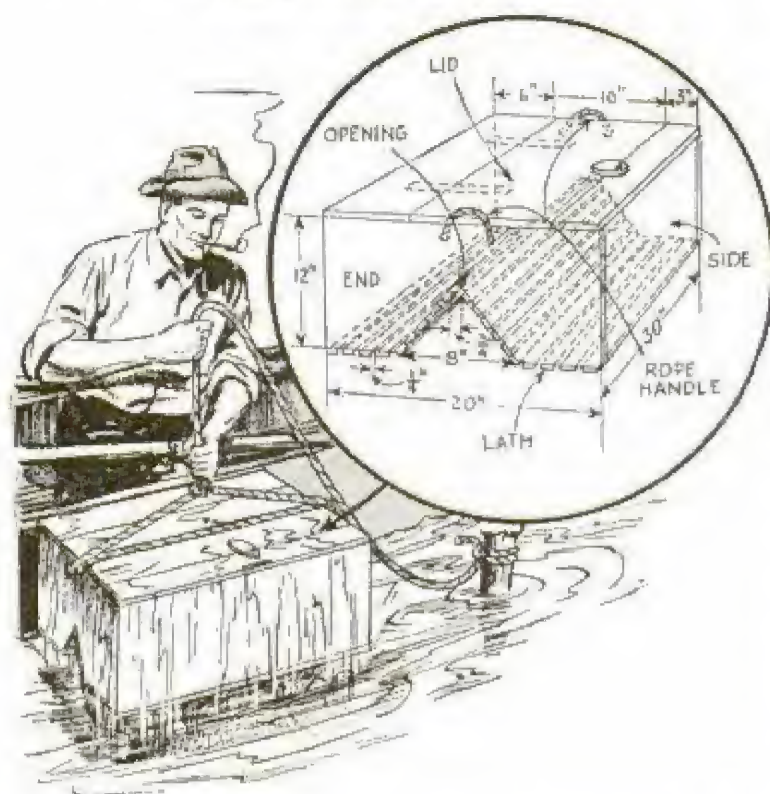


SQUARE



FINISHED WITH A PARING CHISEL

Shrimp Trap Made from a Box Has Slat Bottom



Fishing for shrimp, crawfish, eels, crabs and turtles is simplified with this trap, which is nothing more than a wood box with a slat bottom. Knock the bottom out of the box, cut two V notches in the ends as shown, and nail lath $\frac{1}{4}$ in. apart up to the point of the V, where an opening $\frac{3}{4}$ in. wide provides the entrance. Bait with meat or cottonseed cake. The mooring rope should be long enough to lift trap into skiff without untying the anchoring stage. —R. L. Schreiber, Chicago.

Laying Pieces of Multicolored Tile in Concrete Steps



When you build new concrete steps they can be given a pleasing touch of novelty by laying pieces of broken colored tile in them. To do this, glue the pieces of tile upside down to a piece of stiff cardboard, arranging them as desired and laying them as close together as possible. After the concrete has been poured let it settle for a few hours and press the assembled pieces of tile into the soft concrete. The cardboard

is left fully exposed so that it can be removed without any trouble after the concrete has hardened. Then the cracks between the tile are filled with a thin mixture of cement and the job is finished.

Sanding Belts Cleaned with Wire Brush

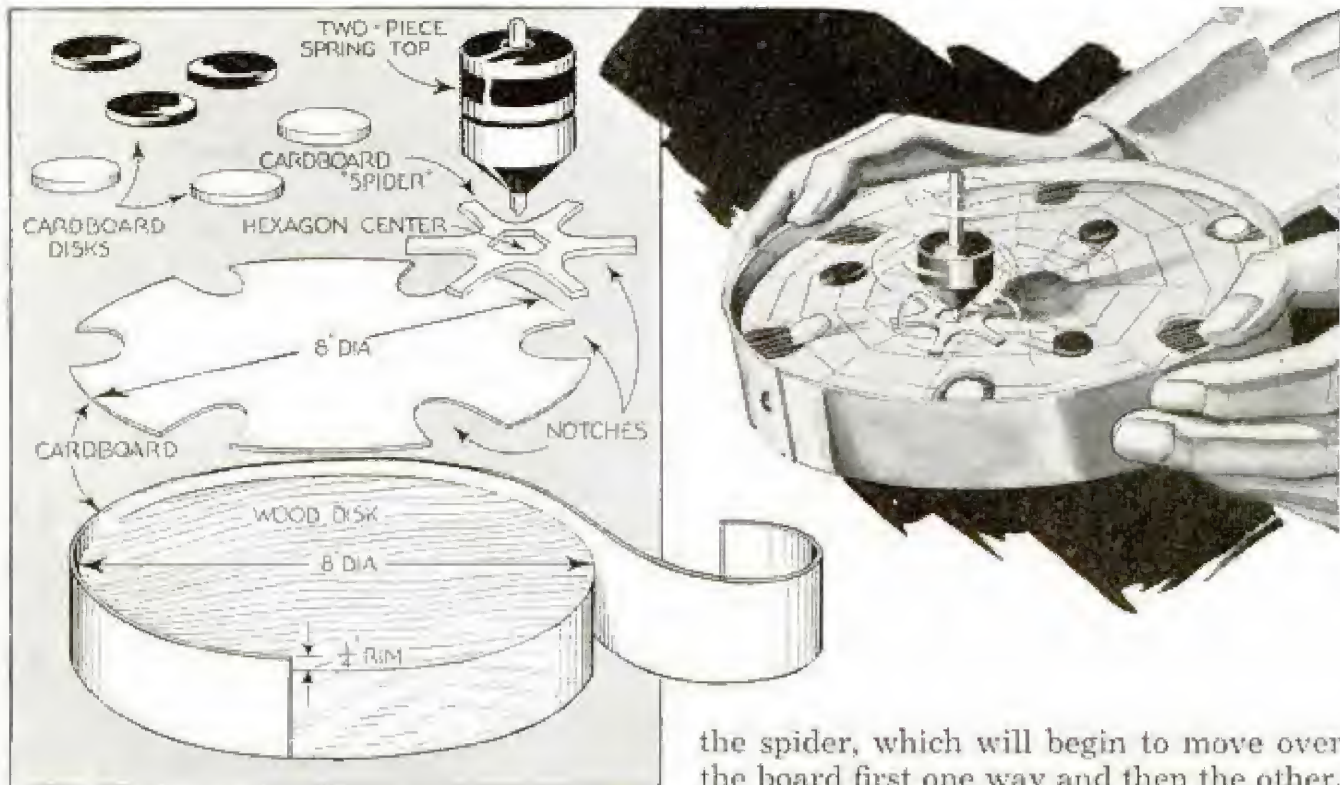
Sanding belts clogged with old enamel, varnish, or resin, often can be cleaned with a stiff wire brush, if there is still sufficient grit left. The brush is held against the moving belt for a few seconds. Remaining particles, if there are any, can be lifted off with a knife point while the belt is stationary. The brush tends to remove some of the grit particles, but most belts will stand several such cleanings before they are completely useless. —Merle J. Lucas, Chicago.

Sprinkler on Brake Drum Easily Pulled over Grass

To move his lawn sprinkler from place to place without shutting off the water, one home owner employs an old brake drum, which is provided with a length of stout fishline to pull it. The drum is heavy enough to avoid being easily overturned. Water that gets inside drains through the hole in the center.



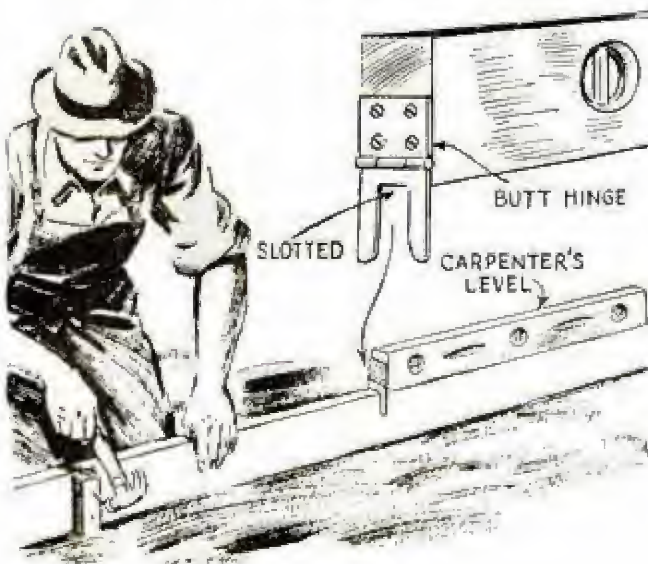
"Fly-and-Spider" Game Is Amusing Pastime



At first glance, this game seems quite simple, but you will be surprised at the skill required to play it successfully. The object of the game is to manipulate the board with the hands so that a top which spins inside a cardboard "spider" pushes six cardboard disks or "flies" into pockets spaced evenly around the edges of the board. To start the play, place the spider in the center of the board with the flies set in the openings around its edge. Then spin the top inside the hexagon center hole of

the spider, which will begin to move over the board first one way and then the other, pushing the flies as it goes. A cardboard disk having six circular slots cut in the edge to form the pockets is cemented to a wood disk, which has a cardboard band around the edge to project slightly and retain the flies and spider. Three flies are of one color and three of another so that two people can play as opponents. The player getting the most flies into pockets during one spin of the top wins. If he should accidentally pocket flies that are not his own, they count for his opponent. Other rules can be made as desired.

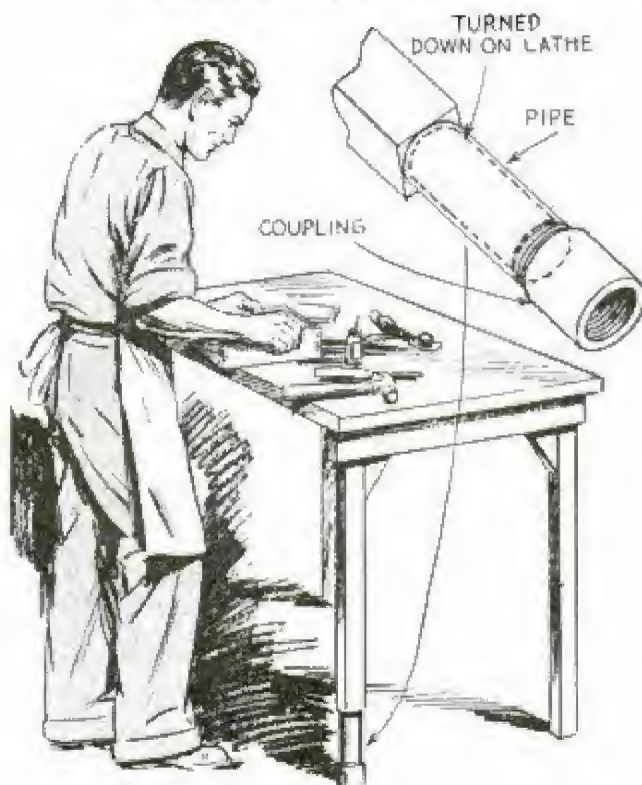
Notched Hinge Holds Carpenter's Level on Board Edge



To have both hands free while using a level on the edge of a board, a workman notched one end of a butt hinge and screwed it to the end of the level as indicated. The notched end of the hinge drops down to straddle the board edge, and can be turned up out of the way when the level is used for other work. The hinge is especially handy when building concrete forms and doing similar jobs where the level must be held on the edge of the work.

☛ Char the cut ends of hollyhock stems thoroughly before placing them in water, and you will find that they will remain fresh for several days.

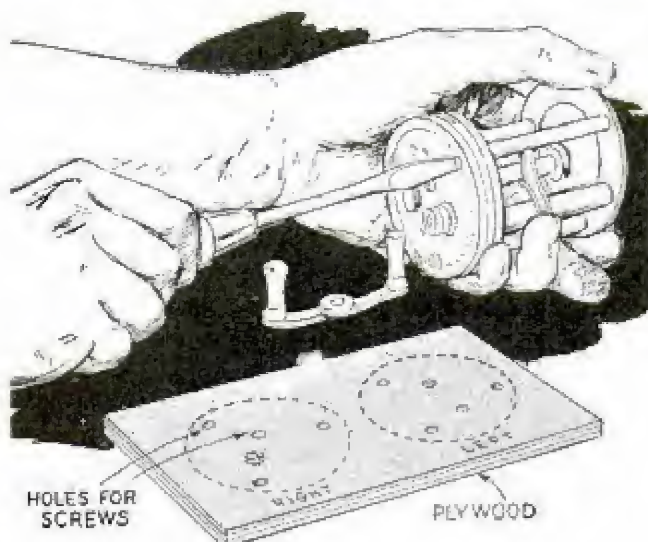
Worktable Leg Is Adjustable for Uneven Floors



One adjustable leg on a portable worktable is handy to level the table when it is being used on an uneven floor. A tenon is turned on the lower end to take a pipe nipple. This is fitted with a coupling, which can be screwed on or off the necessary distance to level the table.

This "Tray" Retains Small Parts When Cleaning Fishing Reel

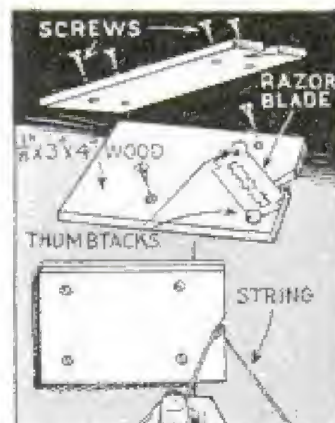
Before taking apart your fishing reel to clean and oil it, scribe a couple of circles on a piece of wood to simulate the ends of the reel and drill holes to represent the



screw positions. Then place the screws and small parts in the holes and you will not lose or mix them.

Sheathed Safety-Razor Blade Provides String Cutter

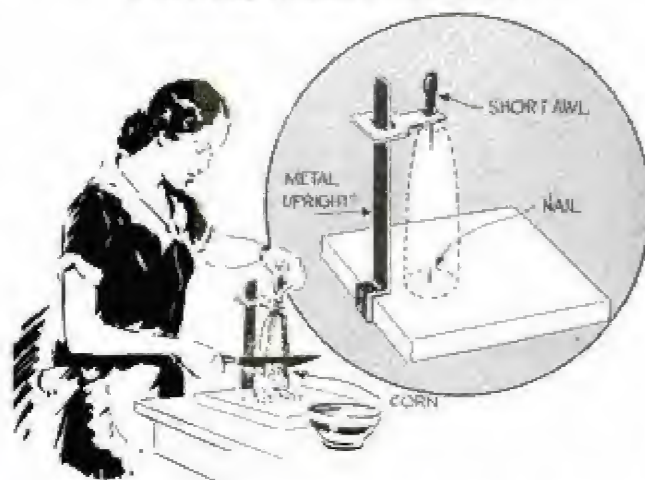
Sandwiched between two thin pieces of wood, and screwed to a wall or cabinet in your kitchen or workshop, a safety-razor blade provides a handy string cutter that is safe. Notch both pieces of wood at one end, and place



the blade at an angle so that the cutting edge will project slightly beyond the inner end of the notches. Fasten the blade to one block with thumbtacks at opposite corners, place the other block over it, and screw the assembly in place underneath a shelf.

—C. N. Suffill, Lincoln, Nebr.

Sweet Corn Is Cut Off Cob Safely on Adjustable Holder

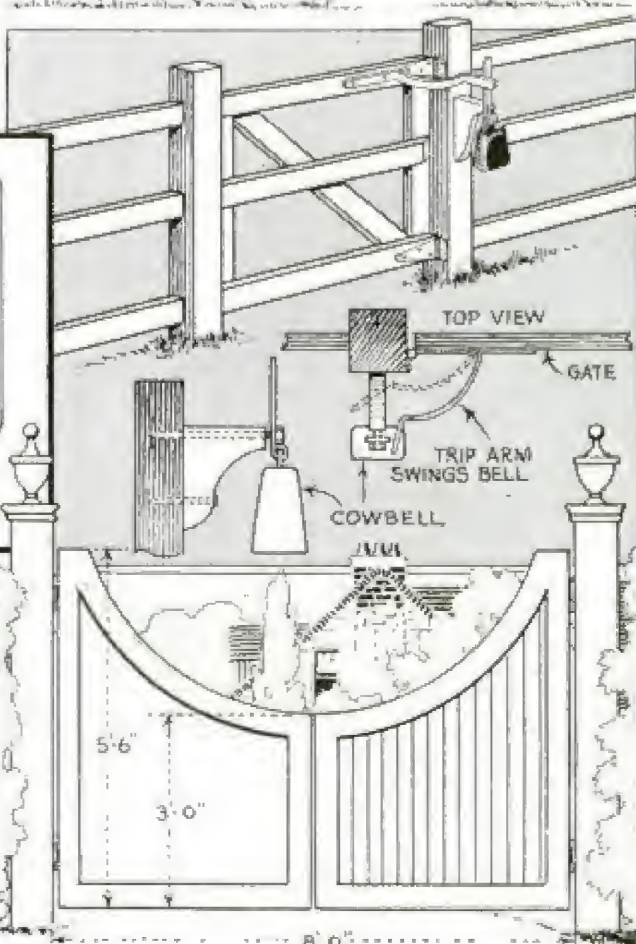
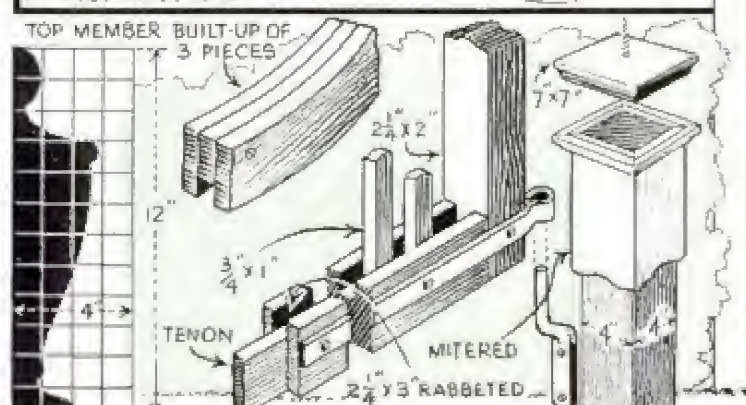
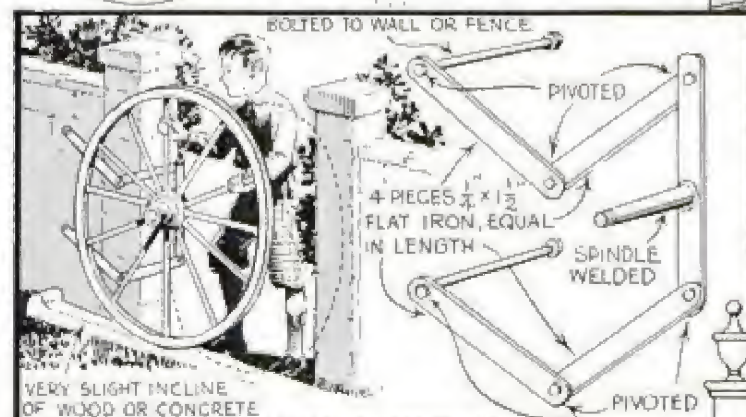
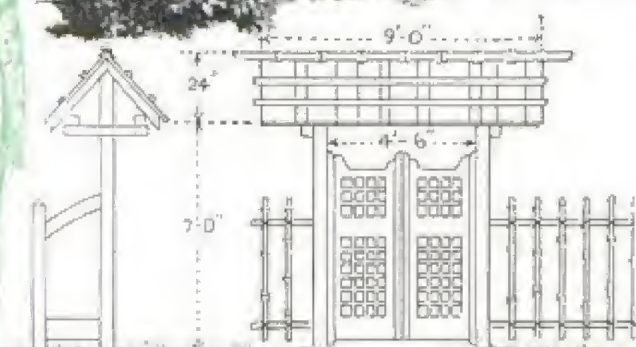
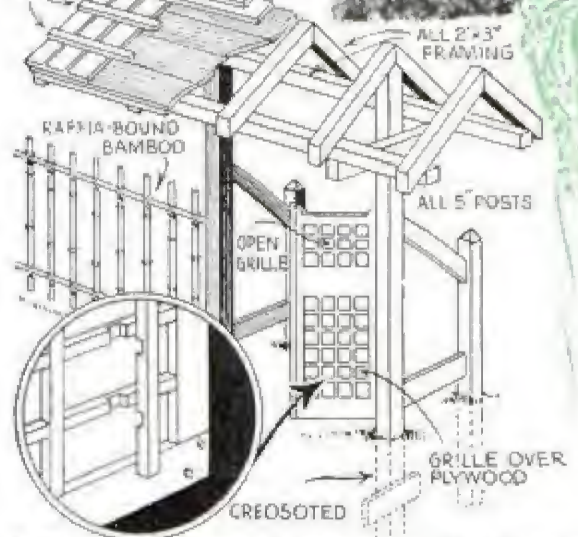


Cutting sweet corn off the cob is less tedious and the possibility of cutting your fingers is reduced with this holder. It consists of a vertical piece of flat iron screwed to a wood base and provided with a slotted bracket through which an awl or an ice pick is inserted into the end of the ear of corn to turn it. A pointed nail driven through the base from the underside serves as a lower pivot for the cob.

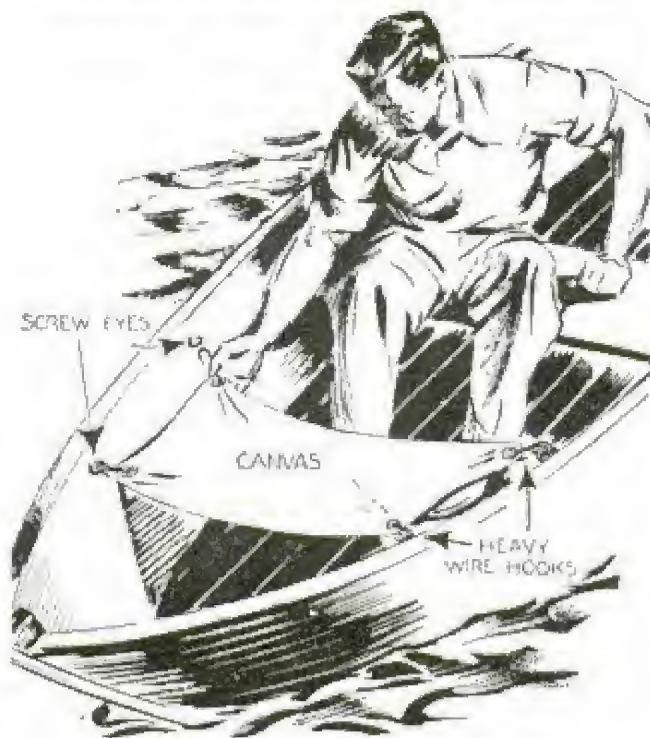
—Opie Read, Jr., Chicago.

4 Garden Gates

LARGE BAMBOO OR RAIN SPOUT PAINTED TO RESEMBLE BAMBOO
BATTENS OVER SHAKES

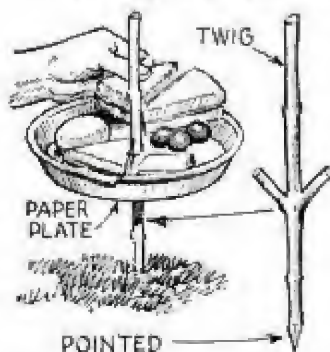


Detachable Canvas Seat in Boat Accommodates Extra Person



This boat seat, which is made from heavy canvas, comes in handy when carrying an extra passenger. It hooks into screw eyes driven into the boat sides and is quickly removed and rolled up when not in use. Heavy grommets at the corners of the seat are fitted with wire hooks.

Twig Holds Sandwich Plate



The next time you are having a picnic lunch you can have both hands free by supporting your plate on a sharpened twig, pushed into the ground. The plate is punctured so that it can be slipped over the twig and is supported on two or three cut-off sprigs.

Splitting Movie Film with Slicer

An easy method of splitting 8-mm. film is to place the cutter in the slicer so that only an indentation is made on the unexposed film when it is run through the slicer. After processing, the film can be grasped between the thumb and index finger and bent with the indentation up-

permost. This will cause the film to split along its whole length. This method will prevent waste resulting from improper slicing after the exposed film has been processed.

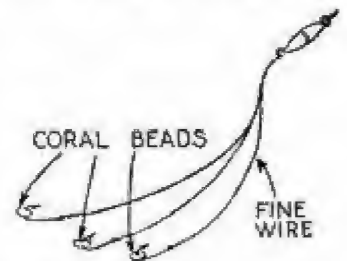
—Sidney Pott, Victoria, B. C., Can.

Catching Trout with Beads

Have you heard how Wisconsin ciscoes are caught on hooks baited with beads? I followed the same idea with excellent luck for trout fishing.

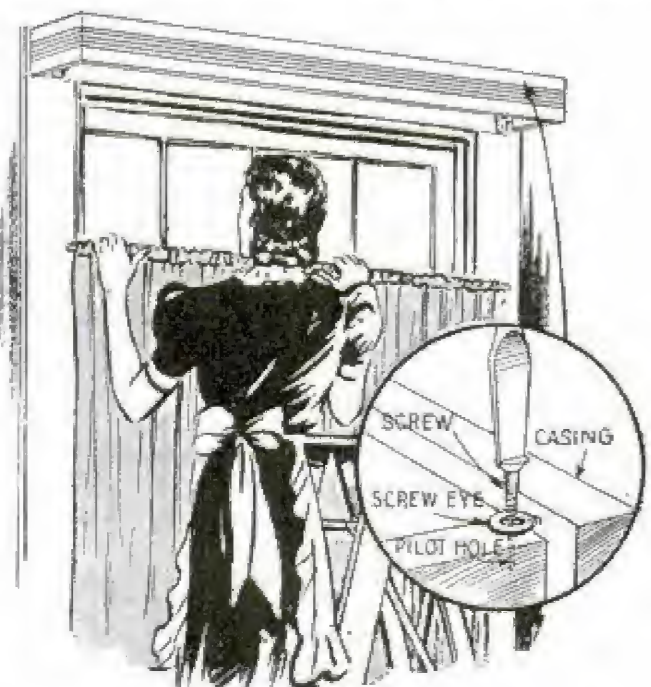
For leaders, I used fine copper wire and three hooks, each of which was provided with a coral-colored bead instead of the usual red ones for cisco fishing. The copper wire was taken from 2,000-ohm suppressors obtained from a radio shop.

—E. H. Hibbard, Jr., Milwaukee, Wis.



Cornices Attached to Windows by Simple Hidden Fastenings

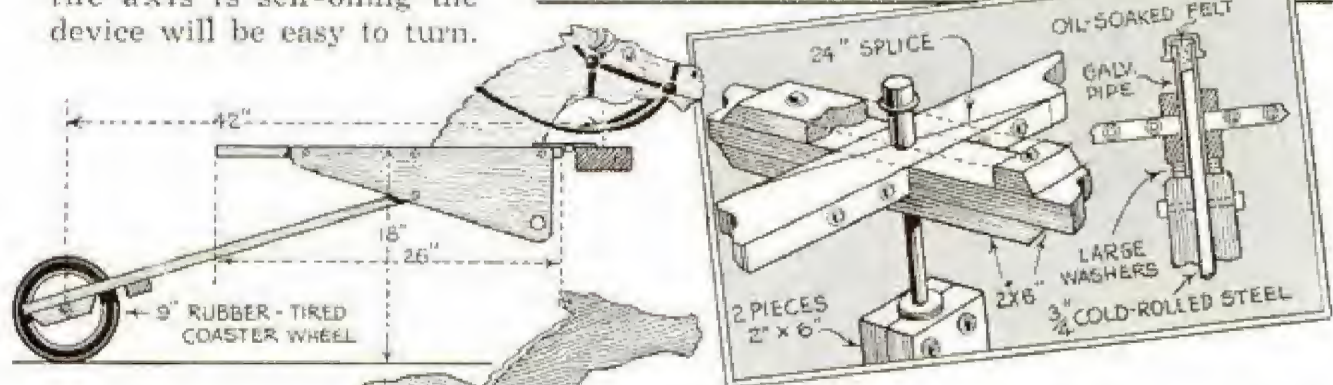
A screw and screw eye provide a simple method of fastening a cornice board safely on a window. The screw eye is turned



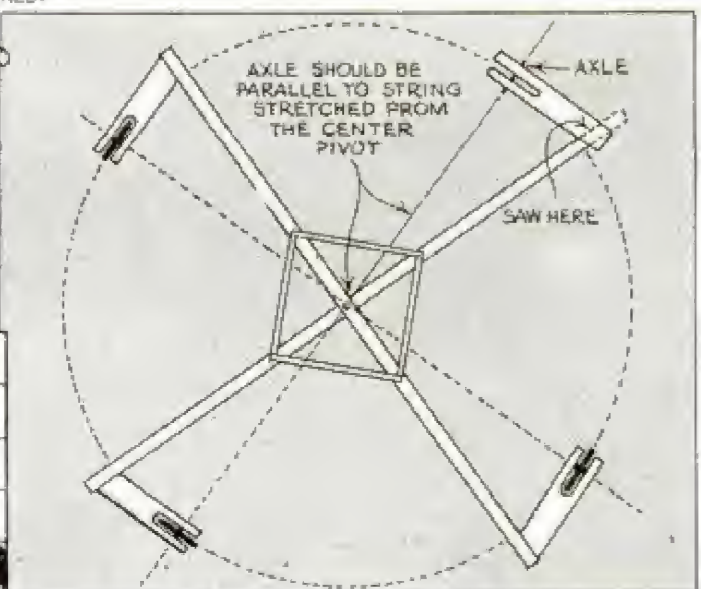
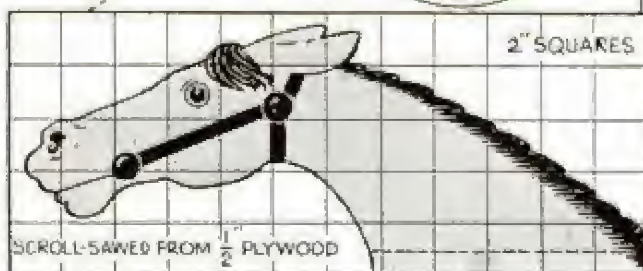
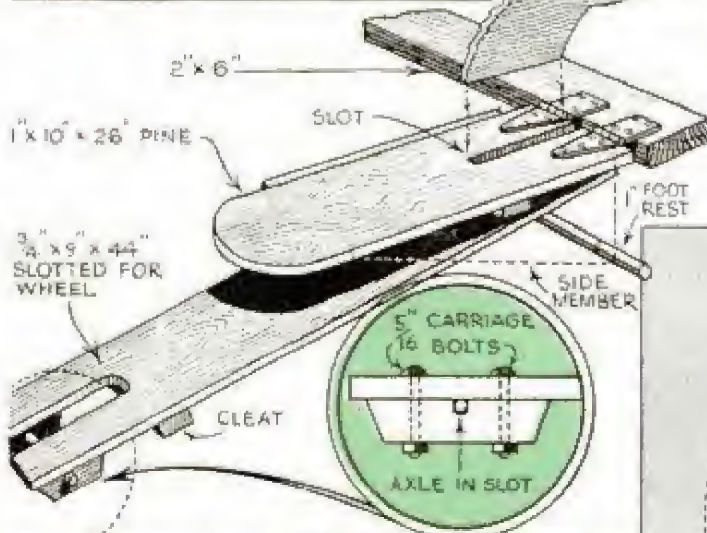
into the casing and a small screw is inserted through the eye and is then driven into the top edge of the board after a pilot hole has been drilled to avoid splitting.

"Steeplechase" MERRY-GO-ROUND in the garden playground

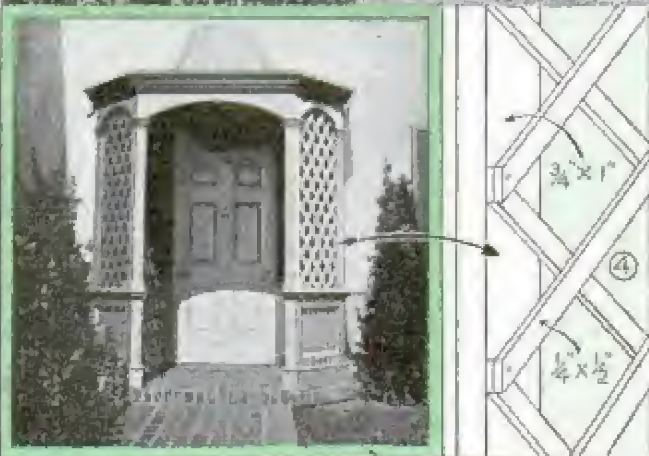
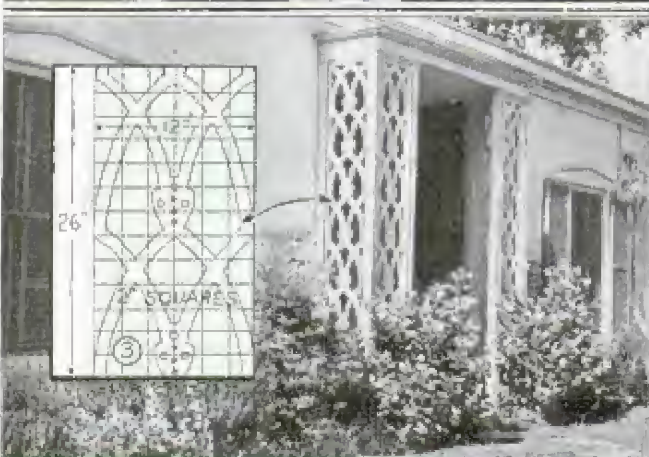
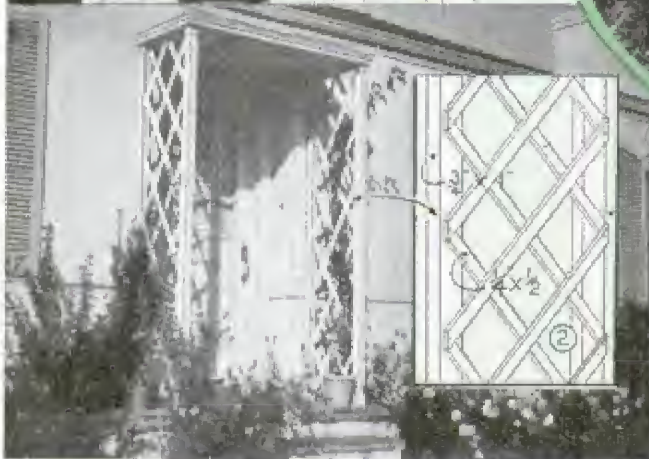
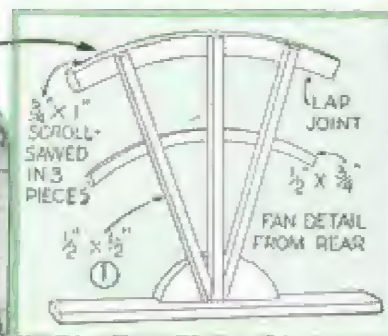
YOUNG jockeys will get plenty of action on this merry-go-round as their steeds take the hurdles. A mere path of hard-packed soil with a little hummock or two forms the circular race track. The hummocks should be on opposite sides so that the effort of pushing one horse up the incline is counterbalanced by its mate coming down the opposite one. The center post is creosoted thoroughly and is set deeply in the ground. As the axis is self-oiling the device will be easy to turn.



To prevent side drag of the wheels under the horses, the latter should be attached to the cross members at an angle, which is found by stretching a string tautly across the center pivot as shown below



Distinctive GARDEN · makes homes



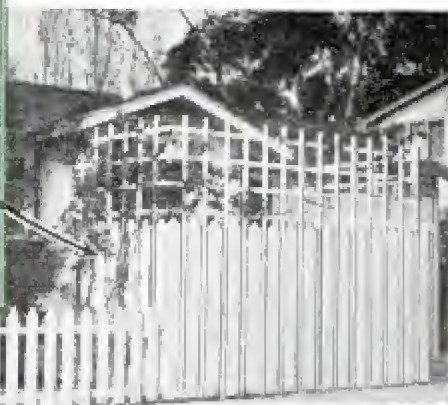
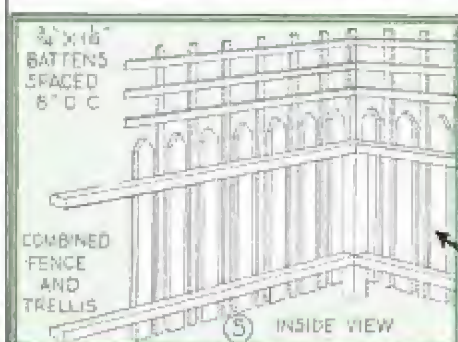
IN ADDITION to ornamental structures in your garden, such as pergolas, arbors and seats, much can be done to dress up the general appearance by well-planned application of trelliswork on the walls of house or garage; by concealing objectionable alley views with proper fencing and by providing distinctive window treatments. Doorways often offer opportunities for decoration in harmony with the general architectural scheme of the home. Also, large expanses of bleak walls and bare corners can be transformed into inviting spots of beauty solely by good judgment in trelliswork.

On this page, you see four trellis effects around doorways, the simplest of which is the one shown above in Fig. 1, where lattice panels are arranged over the door and on each side of it, being spaced a few inches from the wall to provide sufficient clearance for growing vines. Some doorways are brought out to best advantage by simply providing a light, shallow canopy and two lattice panels set at right angles to the wall as in Fig. 2. A canopy of slightly larger size and a partial enclosure of the front, as in Figs. 3 and 4, increase the effect of home privacy and seclusion. The small inserts in the photos give an idea of good proportions and also the approximate size of stock to obtain the effects pictured.

Low, wooden fences of simple design,

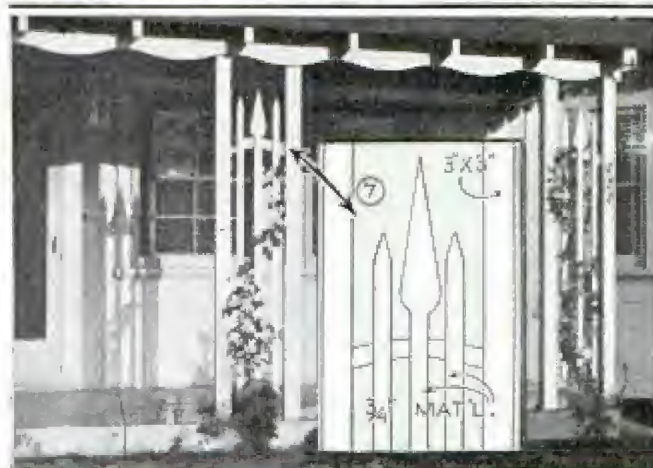
WOODWORK

more attractive . . .



painted white, add greatly to the environment of a modest colonial type of home. The design, with greater height, may be carried out on the alley side with narrow battens between adjacent fence boards to project above the fence itself, forming standards for a trellis as shown in Fig. 5. Two porch pillars of novel design are given in Figs. 6 and 7, the latter serving the purpose of trellises to support lacy vines that will not completely hide the woodwork. Where a lone window looks out over your garden, it can be enlivened by the shelf-and-trellis effect pictured in Fig. 8. This unit can be made portable so that it can be detached and stored during the winter months. Notice especially the pleasing curve of the top piece or pediment.

In applying small wall trellises, it is preferable to attach them directly to the walls, off the ground, which will preserve the wood at the bottom. Where posts must be sunk into the ground, the portions to be buried should be creosoted thoroughly or otherwise protected against rot, so that they will not break off in a couple of years. Wood uprights should not be set in concrete unless the portion below ground is creosoted and wrapped with heavy tarred felt. Otherwise expansion of the wood due to dampness will crack the concrete. Another precaution is to paint all parts with at least a priming coat before you start to assemble them. Then, when you nail the pieces together, coat all of the meeting surfaces with paste white lead.

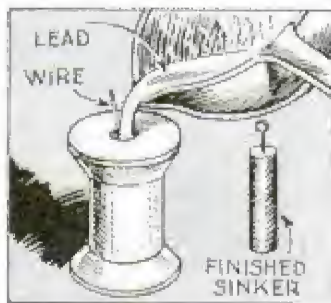


Door Bolt Screwed to Sawhorse Provides Adjustable Stop



Fitted to the side of a sawhorse as shown, a door bolt provides an adjustable stop against which work can be held firmly while sawing or planing it. When not needed, the pin can be lowered out of the way to provide an unobstructed surface across the top of the horse.

Emergency Sinkers Cast in Spool



If you run out of fishline sinkers and there are none available, it's an easy matter to cast some in an empty thread spool, if you have some scrap lead handy.

Plug one end of the spool, then insert a wire in the hole and fill it with molten lead. When this is cooled it can be pulled out and shaped as desired with a knife.

—H. C. Mayer, Cincinnati, Ohio.

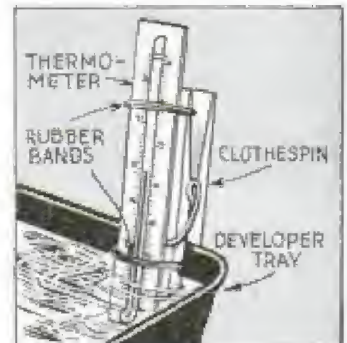
Cleaning Wood Chopping Bowls

Wood chopping bowls will last indefinitely if they are cared for properly, the main reason for checking being that they are often soaked in water and not properly dried. For sterilization purposes, such a

bowl may be dipped in scalding water, but immediately withdrawn and carefully dried, then set in a place where there is neither extreme of temperature nor humidity. For cleaning, it is usually sufficient to wipe the bowl thoroughly with a damp, but not overwet cloth, and set in a location as mentioned. Never set a wooden bowl in the sun to dry.

Photographic Thermometer Clips to Side of Developer Tray

Lashed to a spring-type clothespin with rubber bands, a thermometer can be supported in developer by merely clipping the unit over the side of the tray. It is a good idea to



make a couple of notches in the clothespin to keep the bands from slipping.

Base Prevents Tipping of Polish

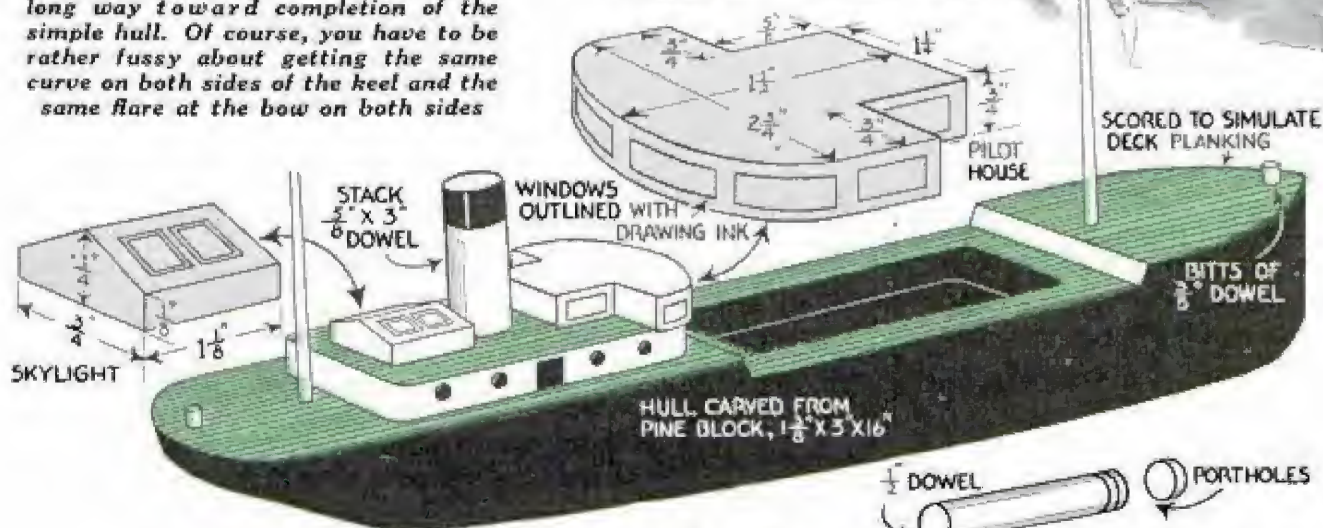
To avoid accidentally upsetting a fingernail-polish bottle, which will ruin the finish on furniture as the solvent in the polish will dissolve varnish, lacquer or enamel, fasten the bottle to a flat base, using some of the polish as a cement. The base can be wood or glass. A small mirror is decorative for the purpose.



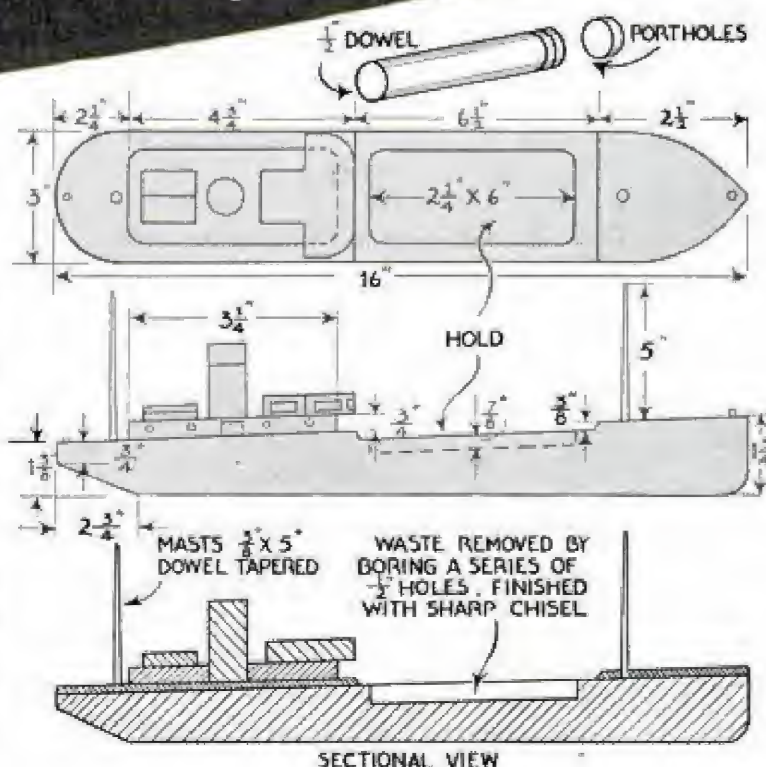
CARGO STEAMER...

for the junior ship modeler

Young modelcrafters with limited tool equipment will like this model freighter because it's patterned after a full-size counterpart, it floats in the backyard pool and it's easy to build. Once you have the block cut to rough shape a sharp knife and chisel will get you a long way toward completion of the simple hull. Of course, you have to be rather fussy about getting the same curve on both sides of the keel and the same flare at the bow on both sides



Remember to crown the deck just slightly before you score it to simulate the planking; about $\frac{1}{16}$ in. is a good approximation. To get the waste out of the hold, first mark its exact size on the deck, then bore rows of adjacent holes to a uniform depth. After that it takes only a few minutes to chip out the remaining waste with a chisel and smooth up with sandpaper. Cabin, skylight and the pilot house are simply blocks cut from $\frac{3}{4}$ -in. stock to the shape and sizes indicated, and glued in place. Windows and doors are outlined with black drawing ink. Masts, stack and bitts are short lengths of dowel, as you see.

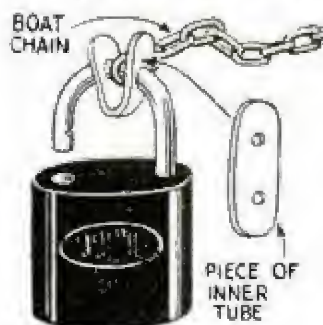


'Cellophane' Baffle over Window Protects Cashier



To safeguard his health while standing in front of an open window, a cashier stretched a sheet of clear Cellophane across the upper part of the window. This not only checked drafts, but also kept him from catching colds and other diseases from customers. Small tabs of gummed tape were used to anchor the Cellophane.

Clip Holds Lock on Boat Chain



After accidentally dropping a boat-chain padlock into the water, I attached it to the end link with a rubber clip. This was cut from a piece of inner tube, the two ends of the clip being slipped over the lock shackle with the chain between them as indicated. The holes in the rubber to take the shackle should be a tight fit.

—G. E. Hendrickson, Argyle, Wis.

Building New Grape Arbors

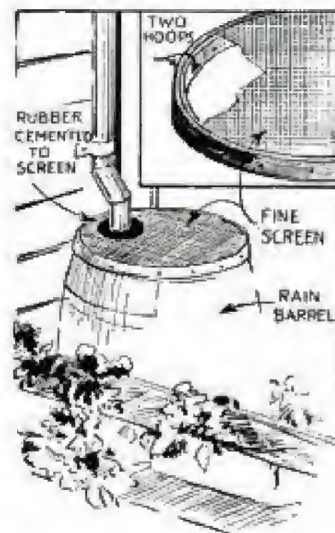
When building a grape arbor, use wood that is enduring. If you want to use a soft wood that is easy to work, and not too

high in price, cypress or cedar will do very well, and are about as good as any soft wood that may be found. If you want the last word in weather endurance, and do not mind working with a material that costs more and is harder to saw and nail, use black locust. This is the lumber from which the glass insulator pins on telegraph and telephone poles are usually made, and it will endure weather conditions longer than any other known species of wood that can be obtained readily.

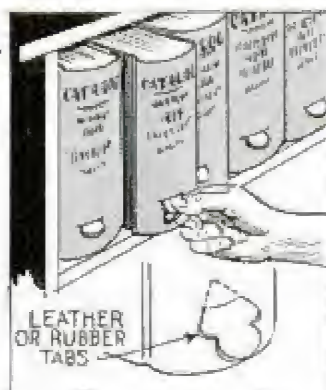
—John E. Hyler, Peoria, Ill.

Fine Screen over Rain Barrel Excludes Insects and Leaves

If you have a rain barrel at one of the downspouts of your home or cabin, leaves and insects can be kept out of the water by covering the barrel with a fine screen. This is placed over the top of the barrel and a hoop is forced down over it. An opening is cut in the screen to take the spout and is lined with a piece of inner tube stitched to the screen to assure a tight seal around the pipe.



Pull Tabs Attached to Books for Removal from Shelf



Difficulty of removing large books and catalogues that have been squeezed together on a shelf may be overcome by fitting them with pull tabs. These are cut from leather or old inner tube and inserted in a slit which has been made in the lower end of the book binding. After the tabs are in place the tongues will spread and hold to resist any ordinary pull.

BUILD YOUR BOAT RIGHT

PART III

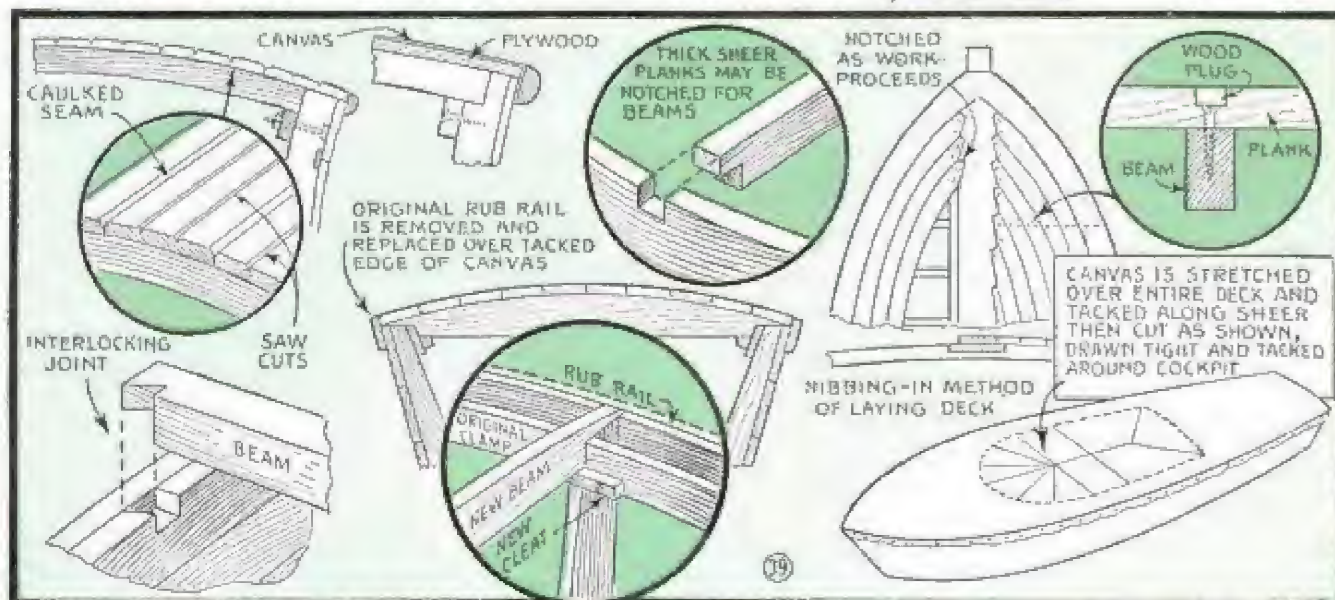
Editor's Note — Before starting on a specific boatbuilding project, the amateur should become familiar with boat terminology as well as various practices and methods involved so that he knows the "how" and "why," which is customarily not explained in plans. This article explains various details about decks, coaming, cabin framing, installing fuel and water tanks, masts, booms and fittings, hints on puttying and painting and other important data

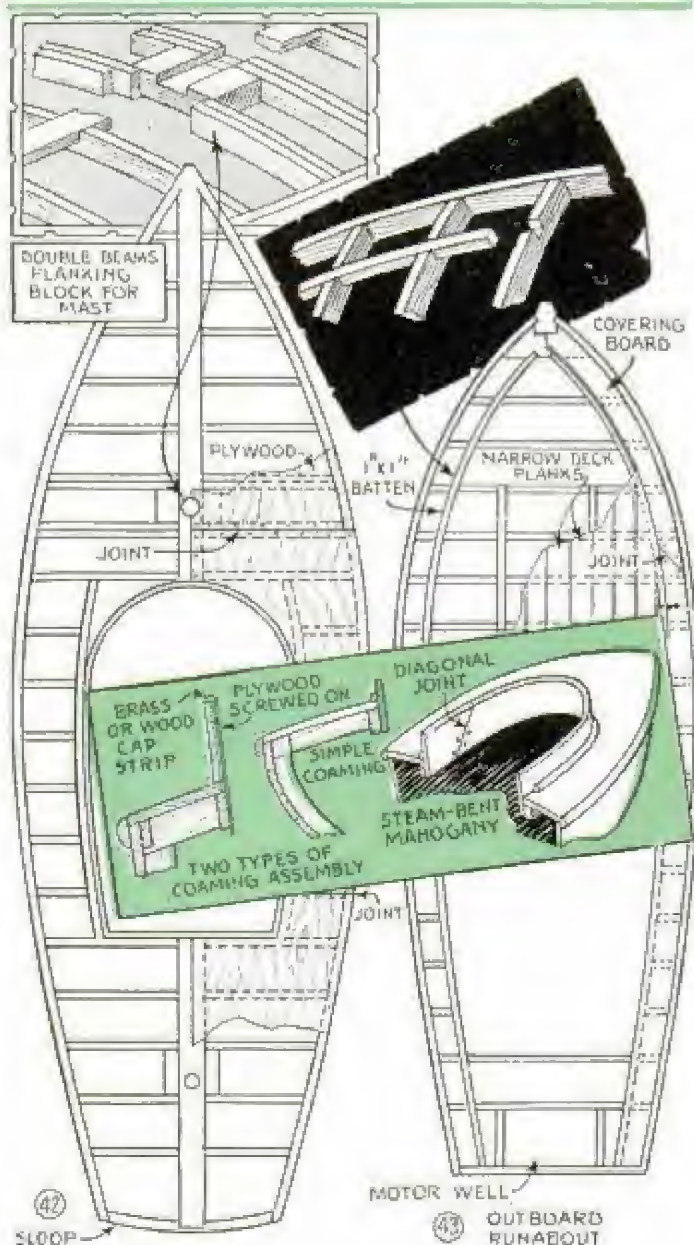
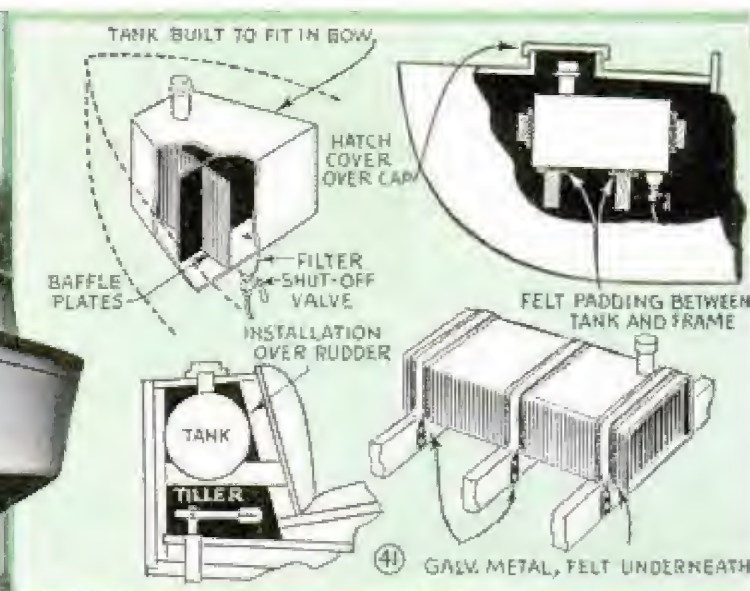
LAYING the deck: Decks may be covered with waterproof plywood, as in light sailboats where beams are placed closely together, or planked in cruisers, as shown in the details in Fig. 39. If plywood is used it always should be covered with canvas. The latter is not so slippery in wet going as a smooth finish would be. The crown of the deck is usually 1 in. per foot of beam width. In other words, if the beam is 4 ft. the deck should curve upward 4 in. above the sheer line. In installing the beams, it is advantageous to bolt or screw the ends to the tops of the frames or ribs. If the latter are too far apart, place beams between, supported by short cleats, Fig. 37. Where the sheer plank is thick and wide enough, it is safe to notch for the beams, as in Fig. 39. However your beams are installed, they must be tested with a straightedge, Fig. 38, as one or two might have warped out of line after installation.



INTERMEDIATE BEAMS SUPPORTED ON CLEATS

TESTING DECK BEAMS WITH A STRAIGHTEDGE

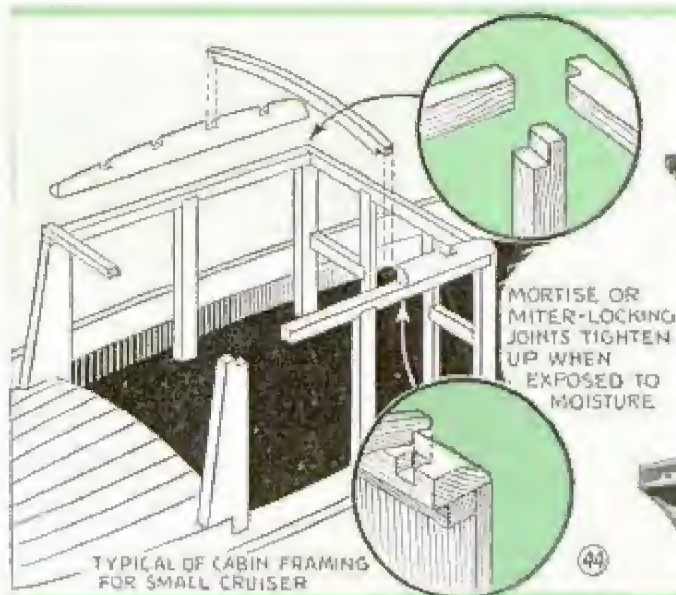




In case of an open boat, such as a dory, which you wish to deck over, all that is necessary is to remove the rub rails, and build as shown in the lower-center detail, Fig. 39. Lay canvas over the planking, copper-tack down along the sheer, and cover with the rub rail. Arrangements of beams for a sailboat differ somewhat from those of a cruiser, Figs. 42 and 43. Here are shown plywood decking for the sloop and planking on the cruiser. The plywood is cut, in this case, in six panels of three pairs, joined at the center line and transversely on two of the beams. These joints will be covered with canvas. Casein glue is applied to the tops of the beams before the plywood is screwed down permanently.

In decking over the cruiser, covering boards are used around the gunwales. It is necessary to set in a batten to which the ends of the fore-and-aft straight planks are screwed. This batten is set in notches to lie flush with the beams. Owing to the curve near the bow it is necessary to make the covering board in two pieces, with a diagonal joint.

Another arrangement of the deck planking, known as the "nibbing-in" method is shown in the top right detail Fig. 39. Each plank end must be fitted as you go along, the notches being cut at the time of fitting, since each strikes the king plank at a slightly different angle. In laying canvas over a deck, professional boat builders have their own methods. One is shown in the lower-right detail in Fig. 39. The canvas is

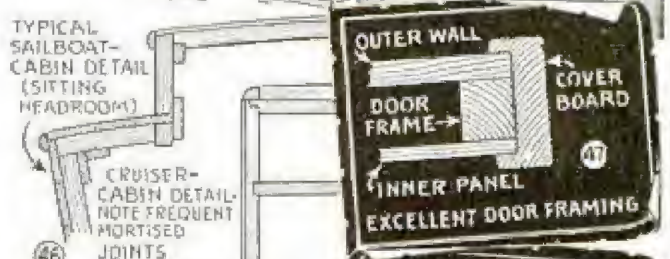
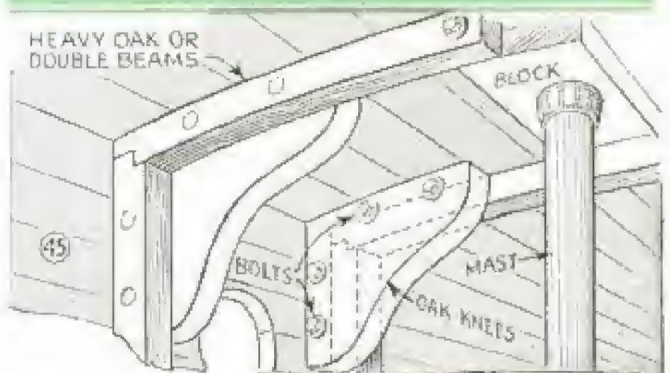


pulled as tightly as possible over the whole deck and tacked at the gunwales. Then the builder treads back and forth on the portion over the cockpit. This method takes out the last bit of slack and shapes the canvas to the deck. Many builders lay the canvas in wet paint. Others soak it in water first and wring out thoroughly, then apply casein waterproof glue to the wood deck, drawing the damp canvas tightly over this and proceeding with tacking as described above.

Fuel and water tanks: Installation of fuel or water tanks in certain hulls will have to be made before the deck is laid. Fuel tanks should be anchored securely to the framing, and be equipped with baffle plates, Fig. 41. Felt or leather strips should be placed between the metal tank and wood supports. Care must be taken to have all connections protected from injury in case cargo or equipment slides about in a heavy sea. See that nothing movable can come in contact with the gas line. Fresh water tanks should be protected from the sun, and be of a material that will not contaminate the water.

Coamings: A trim cockpit coaming adds as much to the smartness of a boat as any other one feature. Mahogany is a favorite material and when steamed will bend readily. Usually there is an inner frame of the same shape to which it is screwed, and the curved front portion joined at an angle. See the details in Figs. 42 and 43.

Cabin framing: A cabin is really a high coaming with a roof and port lights. Typical designs for small boats are shown in





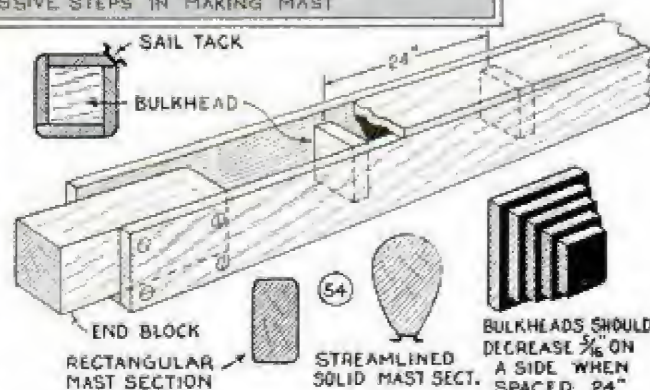
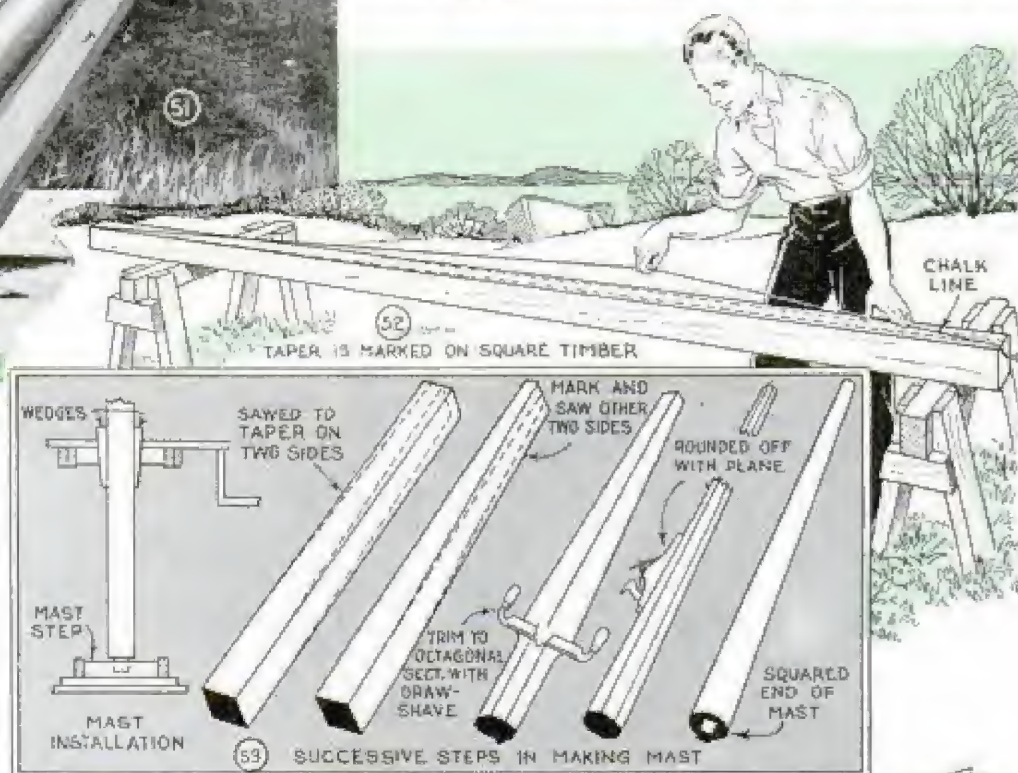
a simple but satisfactory sliding hatch cover can be made as in Fig. 50, the left-hand detail. Port and dead lights should be absolutely watertight, and examples are shown in Fig. 49.

Mast, boom and fittings: Selecting the stock is the important thing in making a mast. Spruce or vertical grained pine is satisfactory. Either is purchased in the square piece, and of course should be free from any defects. If newly surfaced, paint it with linseed oil to prevent checking if you do not intend to trim it at once. The first step in shaping is to mark tapers on

Figs. 36, 40 and 44. Special attention always must be given to the joints of the cabin framing, Figs. 44 to 50 inclusive.

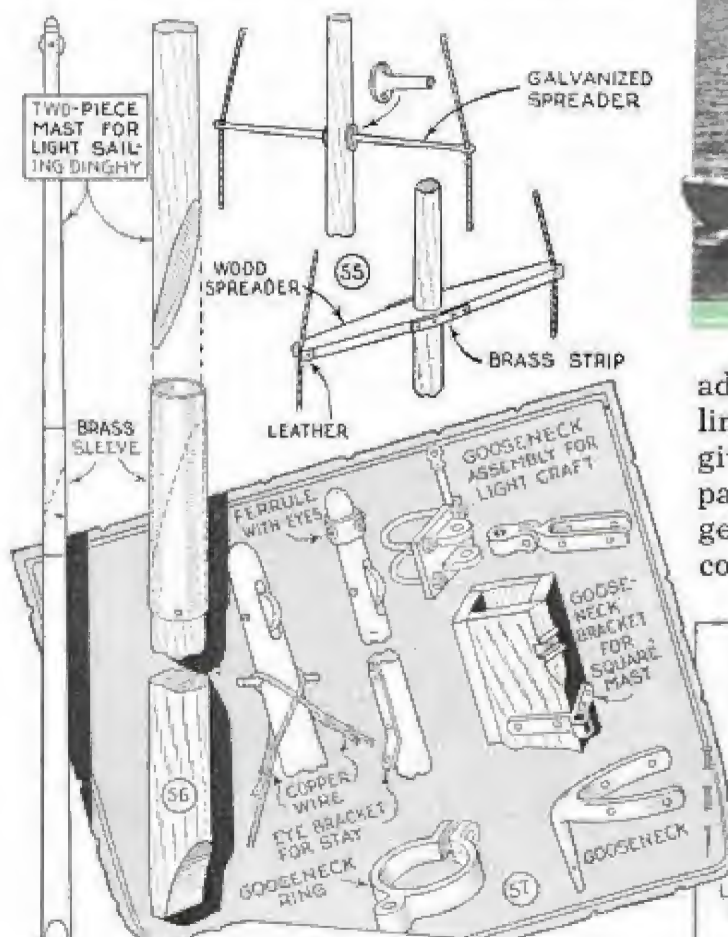
A typical example of good cabin framing is illustrated in Fig. 44.

Joints exposed to rain and spray should be sealed with marine glue before assembly, and unexposed joints with casein waterproof glue. Install a panel of hard-pressed board on the roof before the planking is laid, as this reinforces the structure horizontally, and makes a better appearance inside. Galvanized or brass screws should be used instead of nails, the heads countersunk and covered with putty. Several joints are detailed in Figs. 47 to 50 inclusive. A covering strip over a door, Fig. 47, keeps out moisture and presents a smooth appearance; Fig. 48 shows how to build watertight window frames, while the right-hand details, in Fig. 50, illustrate a substantial corner piece for the cabin. Extra heavy beams with knees should be installed flanking the mast, as in Fig. 45, and



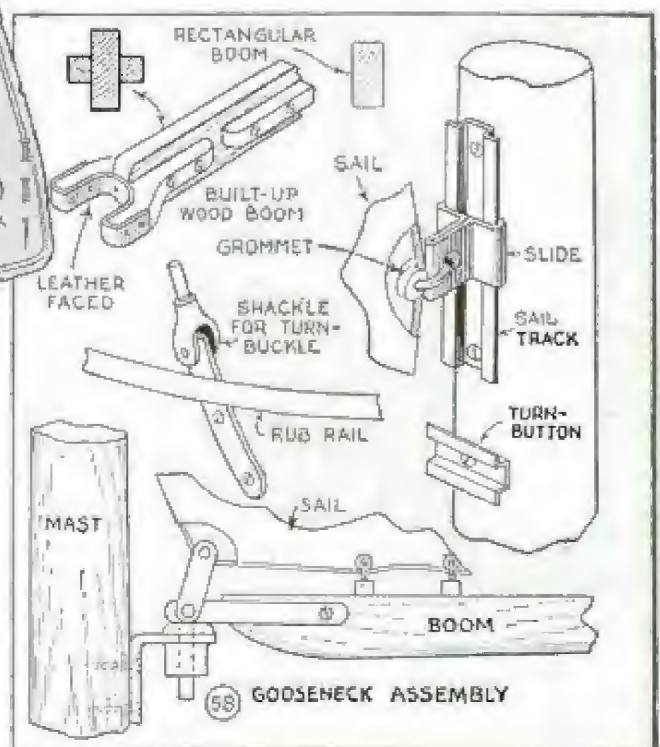
all four sides, easily done with a chalkline as in Fig. 52. Begin the taper at the point the mast meets the deck. After being squared to a taper the rest is easy with drawshave and plane, Fig. 53. A square mast is built up as shown in Fig. 54 to give a taper of about 2 in. in 24 ft. This type is exceptionally strong, when assembled with casein glue, finishing nails and screws.

When screwing down a sail track, Fig. 51 shows one thing to avoid. Note the curve in the mast. After the track is screwed in place it is likely to hold the mast to that curve. The photo has been purposely exaggerated to emphasize this point. See that the mast lies straight before screwing down the sail track. For a light sailing dinghy, a jointed mast is permissible, made as shown in Fig. 56. This can be lifted out and stowed in small space. Several types of mast fittings are illustrated in Fig. 57. Most of these are standard, and can be purchased ready-made. Spreaders for extra tall masts are illustrated in Fig. 55. Fig. 58 shows booms and the fitting of a turn button at the lower end of sail track.

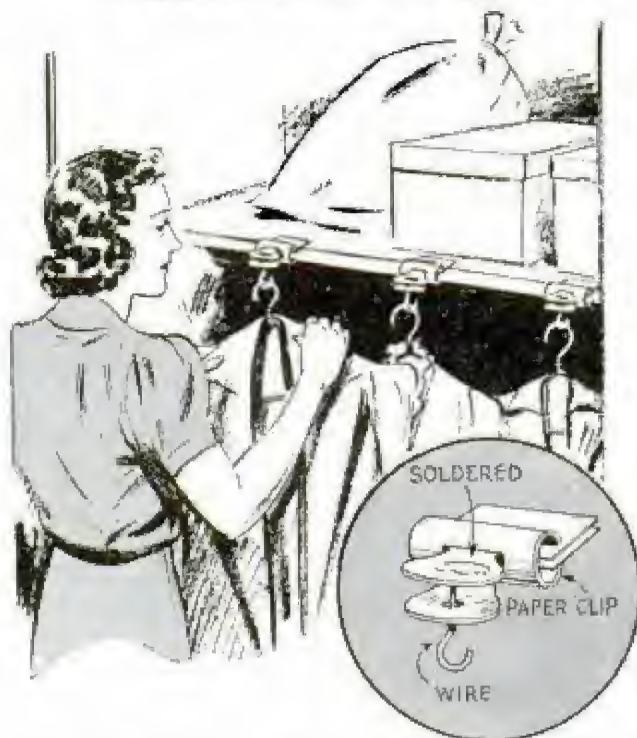


Puttying and painting: Putty should not be applied to raw wood because the latter absorbs the oil, causing the putty to dry out and crumble. Apply linseed oil to the caulked seams with a seam brush, as well as in the countersinks for the screw heads, and putty afterward. Copper bottom paint is applied directly to the raw wood below the waterline. Do not give a priming coat of oil, because it prevents the copper paint from adhering. Two or three coats are

adequate. Above the waterline prime with linseed oil with just enough white lead to give it body. When dry, coat with marine paint. For planked decks, a spar varnish is generally used. The mahogany transom, coaming, and rub rails are treated likewise.



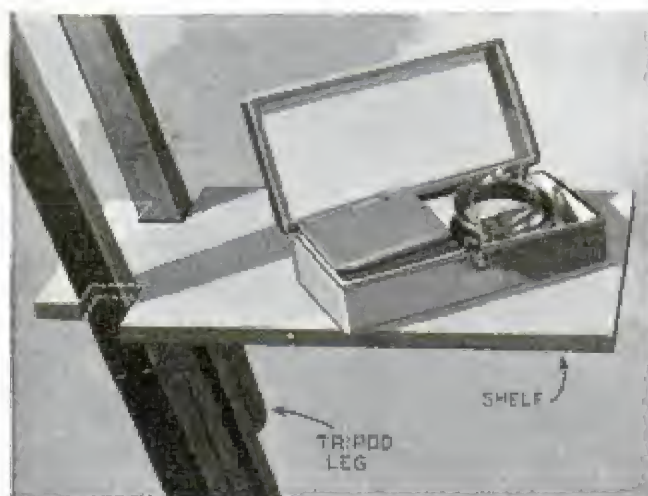
Large Clips on Closet Shelf Support Extra Hangers



When space is needed for hanging extra clothes hangers temporarily, large paper clamps will serve to support the hangers from the edge of a shelf. A wire hook run through the holes in the handles of each clip provides a simple hook.

Handy Tray Attaches to Tripod

Cut from a piece of plywood, the shelf shown is instantly attached to a tripod leg for holding miscellaneous camera accessories. If necessary, narrow strips can



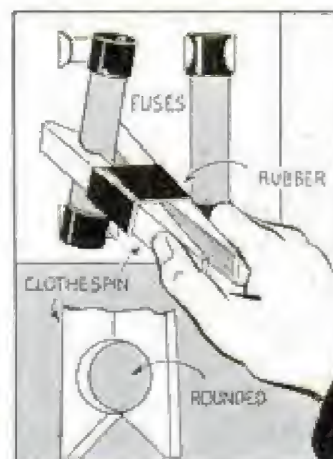
be screwed to the edges to prevent the articles from rolling off. It is a good idea to finish the shelf with varnish or enamel to avoid warping.

Building Hoop-Design Furniture to Enhance Your Garden

Use of hoops in the construction of this comfortable garden furniture lends a novel touch that is unusual. The hoops are made of $\frac{1}{4}$ by 2-in. spruce strips steamed and bent over a form. If you have no convenient way of steaming the hoops, soak them in water for 24 hrs. or more, and then bend them around a form assembled by nailing curved blocks to a workbench or other flat surface. It is best not to bend the wood around spikes, as they will leave marks or dents. Allow the wood to dry thoroughly before removing it from the form. The squared side view gives dimensions and locations of the curved frame members of the chair, which are all 1 by 2-in. pine and are assembled throughout with dowels. No mortise-and-tenon joints are used, thus greatly simplifying construction. Casein waterproof glue is applied to all joints. The settee is the same construction as the chair. The frame members, however, are heavier, being $1\frac{1}{8}$ -in. stock, the seat slats $\frac{3}{4}$ -in. stock, and the back slats may be spaced farther apart than those of the chair. A support is installed under the center of the seat. An attractive lawn table is made with a circular or square top of $\frac{3}{4}$ -in. plywood. A hoop is assembled with each pair of legs and secured to the top by means of cleats on the underside of the latter. The feet are identical with those of the chair and settee, except that the legs and ends of hoops are spaced differently. A thorough paint job will prolong the life of this set and enhance its appearance.

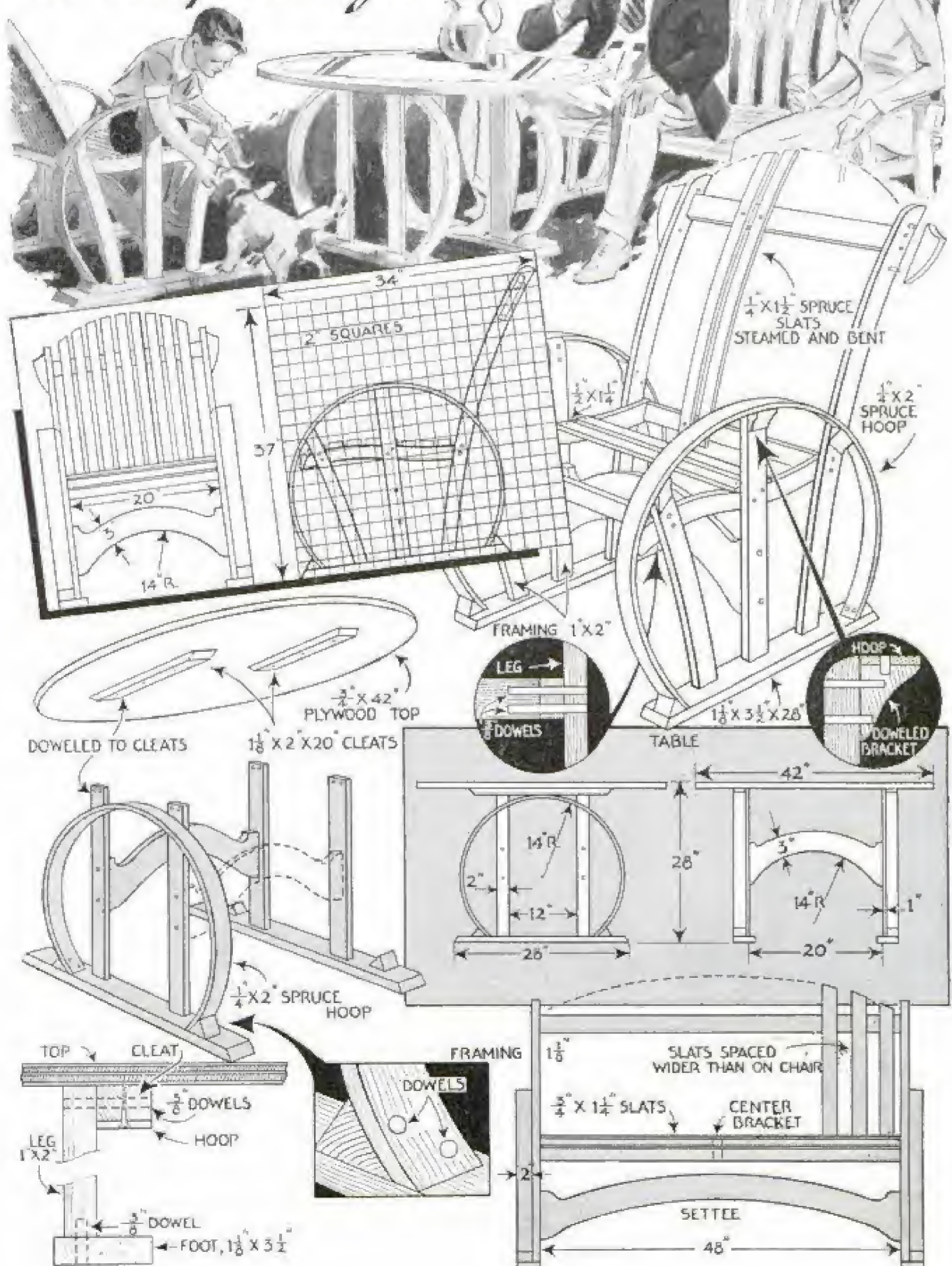
Cartridge Fuses Pulled Safely by Using Spring Clothespin

Fuses of the cartridge type can be inserted or removed without danger of shock if you use a spring clothespin. The inner surfaces of the jaws are rounded out and a rubber band over the pin increases its grip.

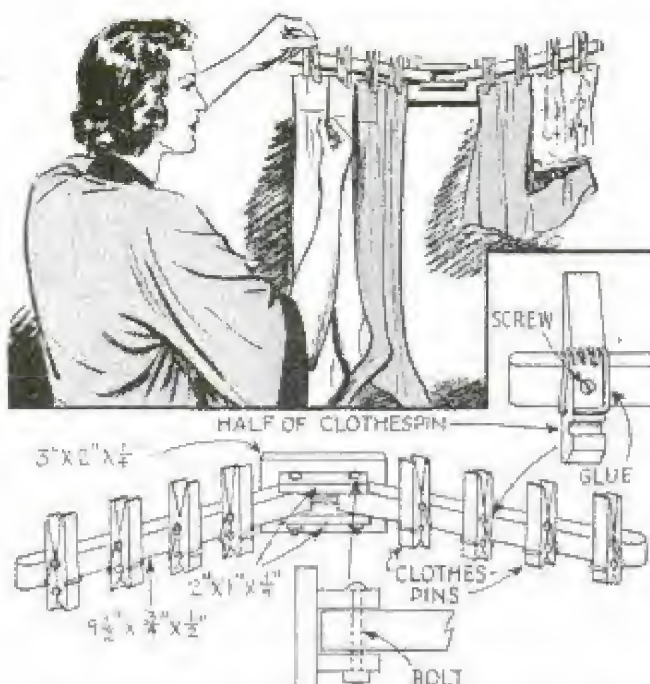


GARDEN FURNITURE

in "hoop" design



Clothespins on Bathroom Rack Grip Garments Securely



Small silk garments hung on this two-arm, swinging rack to dry will not slip off because each one is held by spring-type clothespins. When not in use, the arms of the rack fold back against the wall. Each clothespin is taken apart and one half is screwed and glued to one of the arms, after which the pin is reassembled.

Twine Dispensed in Workshop Through Funnel on Wall

When you need a twine holder and there is none at hand, just hang a tin funnel on the wall, insert the ball of twine and pull



the end down through the funnel spout. Such a holder is only suitable for balls of twine that unroll from the inside.

—V. H. Miller, Vancouver, B. C., Can.

Solder Dip Cures Loose Track Pins in Model-Railway System

Loose track pins in a toy or model-railway system cause noisy operation and poor power conduction to the motor. A good way to secure tight-fitting pins is to melt a small quantity of solder in a crucible and dip the pins, coated with rosin or some other flux, into the melted metal. In case one dip will not make a pin sufficiently tight, a thicker coating of solder may be added by a second or third dip. Be sure to make these successive dips quickly so that the already adhering layer will not have a chance to melt.

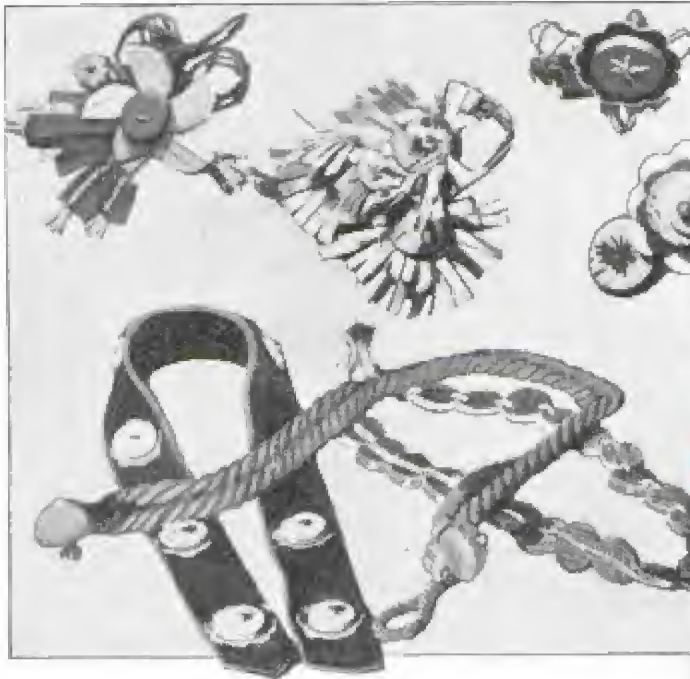
Composition Roofing on Boat Pier Provides Non-Slip Surface



By simply tacking composition roofing on a boat pier you can overcome the danger occasioned by wet, slippery boards. The kind having a crushed slate coating was found highly satisfactory and will last for several years.

☞ When popcorn fails to pop readily, place it in a strainer and pour hot water over it. Then shake off as much water as possible. This adds moisture to the corn, which is necessary if it is to pop well.

New Sportswear Jewelry and Flowers of Cork



For summer sports apparel and particularly for beach costumes, all kinds of novel belts, bracelets, buttons, flowers and other accessories can be fashioned from ordinary corks just as you see them here. It's no trick to slice the cork as required. Simply spread a light film of machine oil or vaseline on a sharp knife blade and it's easy. The "chain-disk" belt shown above is a good example of the work. First cut a number of $\frac{1}{4}$ -in. disks from fairly large corks; then assemble them by using a darning needle, making short stitches $\frac{1}{8}$ in. from the edges of the disks on the right side to fasten them together. Finish with a long stitch on the reverse side of each disk. To prevent the disks from turning, run another length of cord or raffia under the long stitches at the back as shown. Tie the lengths together at the last disk and finish the ends with tassels. Imitation flowers to wear in clusters may be made in several ways as you see in the details. One type uses disks of two colors with a bead strung on wire to hold them together. Another is made by fringing a narrow strip of rubber and winding it around the whole cork. Other types are simply variations of those described and once you get into the work, designs will suggest themselves.

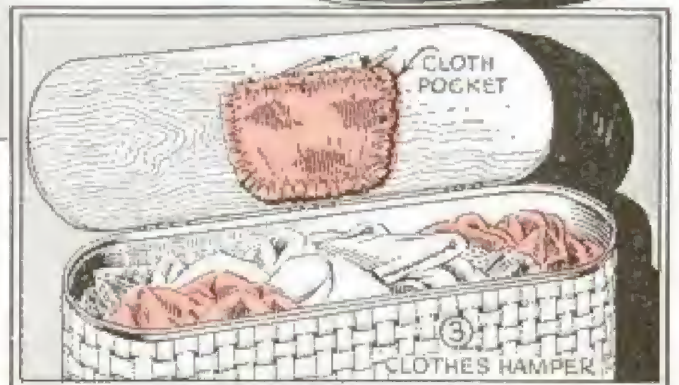
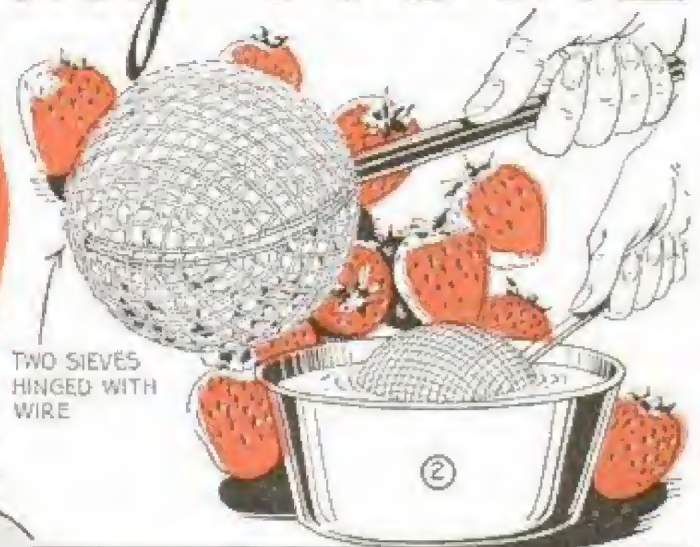
☛ Tarnished brass can be brightened by rubbing it with half a lemon dipped in salt. Polish the brass with a dry cloth.



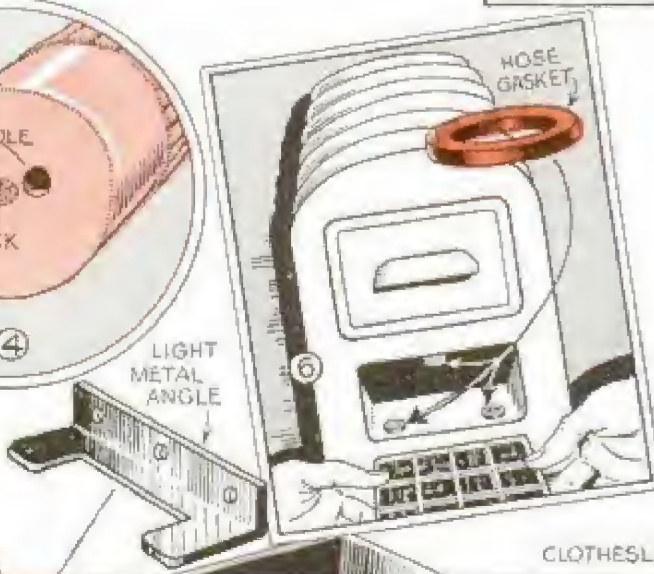
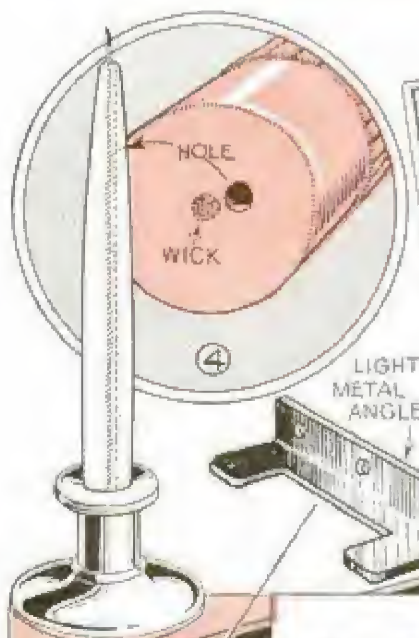
Solving HOME



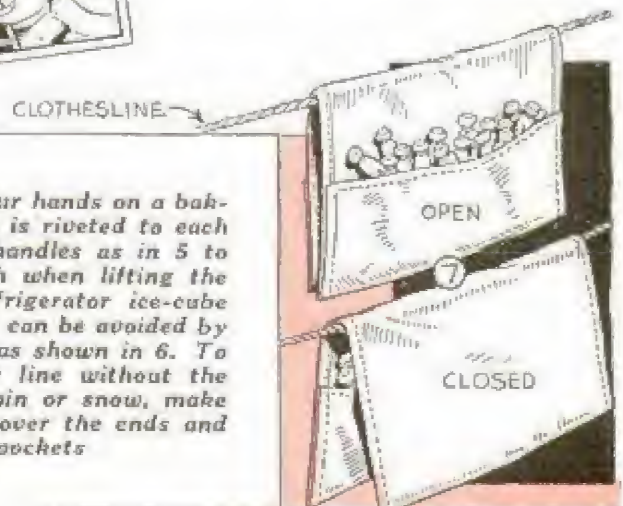
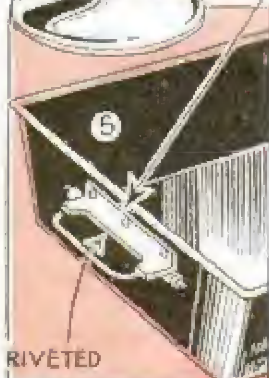
Crocheting thread is less likely to become entangled in the work or clothing if it is run through a safety pin fastened to your dress as in 1. For washing berries and fruits that are likely to stain the hands, put them inside a couple of sieves that have been hinged together as in 2, and swish back and forth in water



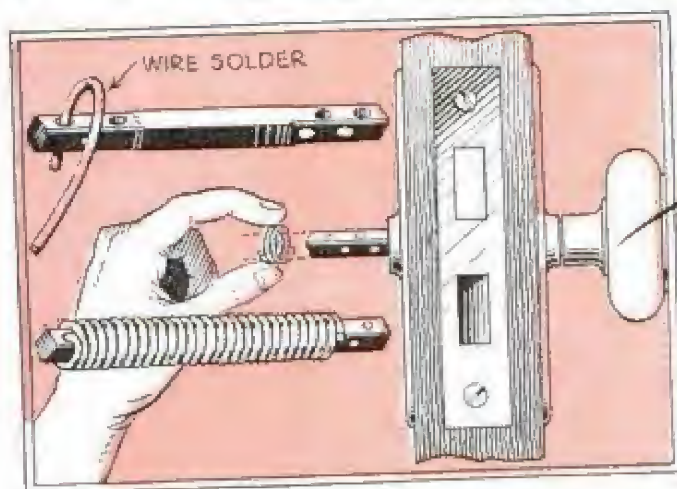
Your laundry list and pencils are always at hand if kept in a pocket attached to the clothes-hamper lid as in 3. Using daintily figured cloth and shirring the edges will improve the appearance of the pocket; hem the top edge to take a piece of elastic to keep it closed. The pocket can be tacked in place if the hamper is wood, or cemented if metal. Candles will give off a pleasant odor if you make a small hole lengthwise of each one close to the wick, as in 4, and fill it with powdered incense



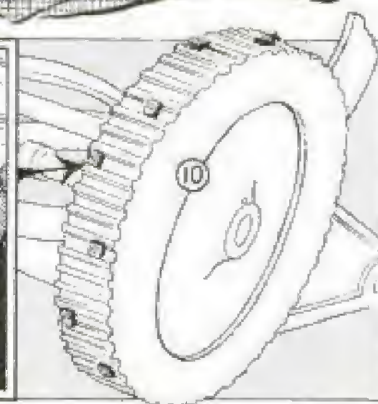
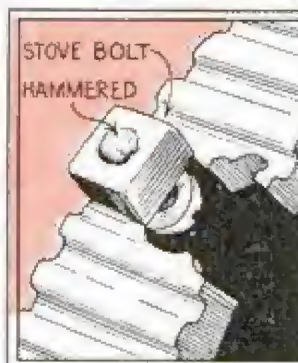
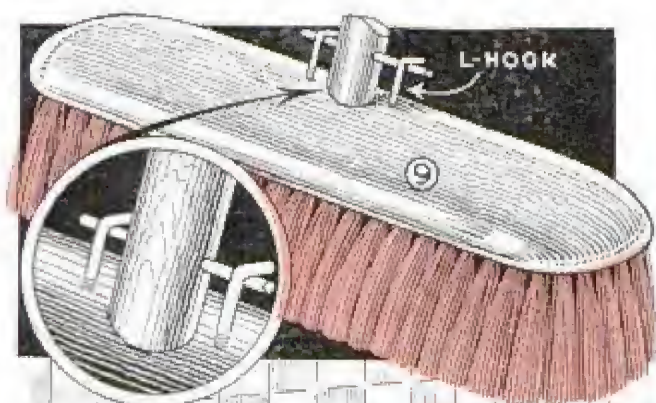
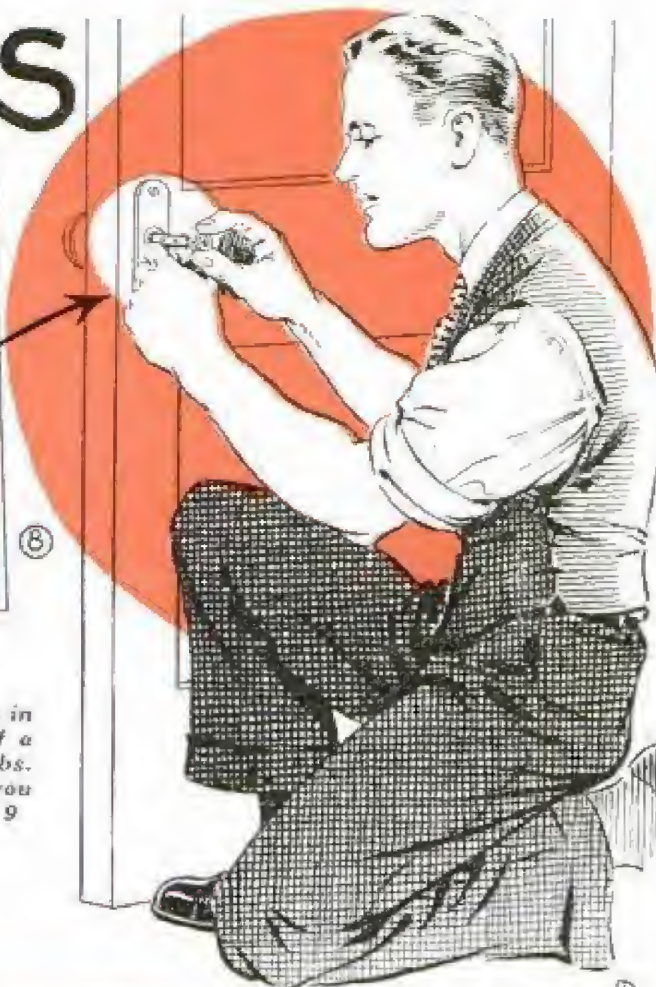
You will be less likely to burn your hands on a baking pan if a piece of metal angle is riveted to each end of the pan just above the handles as in 5 to keep them from raising too high when lifting the pan. The tendency of some refrigerator ice-cube trays to stick to the freezing unit can be avoided by cementing hose gaskets in place as shown in 6. To keep clothespins handy on your line without the container becoming filled with rain or snow, make it of oilcloth as in 7 by folding over the ends and sewing them to form pockets



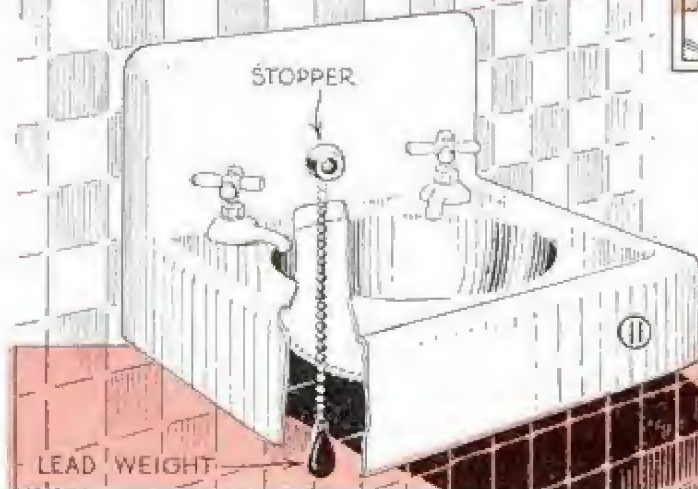
PROBLEMS



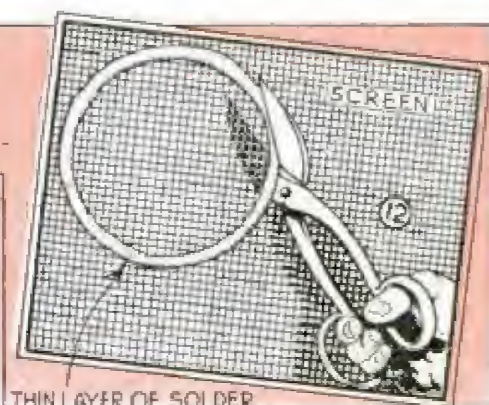
Loose doorknobs can be tightened with wire solder as in 8. First wrap it on the knob shank, and then cut off a "washer" from one end to take up the play in the knobs. Loose handles on push brooms will stay in place if you use a couple of L-hooks and a heavy wire pin as in 9



Non-slip lugs for wheels of a lawnmower can be made with stove bolts. Drill a number of holes in the rims, staggering them as in 10. Insert the bolts and drive the nuts on the outside. Then carefully rivet the projecting ends of the bolts with a hammer, resting the bolt head on an anvil to avoid breaking the cast wheel rim



A lavatory stopper is always out of the way if the chain is run through the anchor-pin hole and counterweighted as in 11. When cutting small disks of screen for strainers, the edges can be kept from unraveling if you spread a thin layer of solder over the wire, if it is not coated with paint, as in 12



Safety Back Rest on Swing Protects Small Child



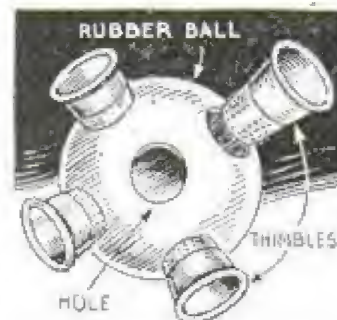
This back rest can be adjusted up or down to prevent little tots from falling backward. It is a length of heavy puncture-proof inner tube with holes burned

through it near the ends to take the swing chains or ropes. If regular tubes are used for this purpose, they are apt to tear out at the holes. Discarded puncture-proof tubes can be obtained at most tire shops at little cost.

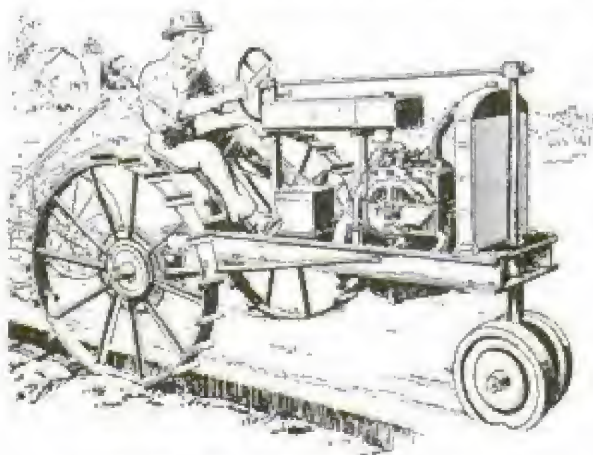
—M. W. Mutschler, Lincoln, Nebr.

Ball Keeps Thimbles Together in Sewing-Machine Drawer

When a number of thimbles of different sizes are kept with other articles in a sewing-machine drawer, it is often difficult to locate the one desired. If a small, hollow rubber ball has holes cut in it to take the thimbles, they can be kept together.



Farm Tractor Built from Used Auto Parts



OTHER USEFUL PROJECTS

UTILITY TRAILERS—986 and 987: Built of old auto parts and lumber. Adaptations of body to suit various purposes. Two prints 50c.

ELECTRIC SPOT WELDER—891 and 892: Works on 110-volt, 60-cycle alternating current. For small work up to $\frac{1}{8}$ in. in thickness. Two prints 50c.

LARGE CABINET WORKBENCH—898: 35 in. high and has twenty drawers. Top is 27 in. wide and 7 ft. 10 in. long. 25c.

CARPENTERS' TOOL BOX—824: $8\frac{1}{4}$ by $13\frac{1}{2}$ by $31\frac{1}{4}$ in. in size. Carries your large planes, saws, and many other tools. 25c.

This farm tractor has plenty of power to pull a two-bottom plow, a two-row cultivator and other implements. Includes a Ford model-A motor and twin transmissions giving six speeds forward. Wrenches, hacksaw and drill are about the only tools needed—welding can be done at your local machine shop. Set of three plans, Nos. 1024 to 1026 incl., containing all necessary constructional details and a list of materials needed will be sent postpaid upon receipt of 75c.

400 Build-It-Yourself Plans

Every home workshop owner should have our illustrated catalogue for constant reference to get ideas on what to build. Shows nearly all projects as they look when finished. Includes modern and colonial furniture, home and garden improvements, workbenches, tool cabinets, motor-driven machines, models of all kinds, outdoor-sport devices, radio equipment, electrical devices, toys and novelties, juvenile articles, etc. The only cost to get this new catalogue is a three-cent stamp. Be sure to print your name and address carefully when ordering.

Any six of these plans (not projects) will be sent upon receipt of \$1

Address Plan Service, Popular Mechanics Magazine, 200 East Ontario St., Chicago



Sound and Picture Receiver for Experimenters

IF YOU are fortunate enough to live within receiving range of a station broadcasting television programs, and have had some experience in assembling radio apparatus, this combination receiver offers a practical kit assembly that will enable you to tune in the RMA standard television signals. A complete sound and (video) picture receiver in one unit, special attention has been given to simplified arrangement of controls and shockproof design.

It is a superheterodyne covering the 44 to 50 and 50 to 56 megacycle channels, with provision made for adding coils to a switch assembly as additional frequencies are assigned for television use.



Both sound and picture channels are tuned simultaneously by means of this selector switch and a small vernier condenser. There are six controls on the front of the panel; four additional, seldom used, knobs are brought out on the left-hand side of the chassis. All of these knobs are grouped in a manner easy to understand and convenient to use.

A half-wave dipole antenna, that looks very much like a couple of curtain rods mounted on a wooden upright, is used for reception. The twisted pair transmission line should have an impedance of approximately 110 ohms to connect the antenna to the receiver. A conventional antenna with a single-wire lead-in is not recommended because such an antenna and lead-in pick up reflected signals from several directions and may cause multiple images to appear on the cathode-ray tube.

Photos Figs. 1, 2 and 3 show various views of the completed instrument and the method employed to inclose the power



(Continued to page 132A)

Messner

W. G. McIntosh

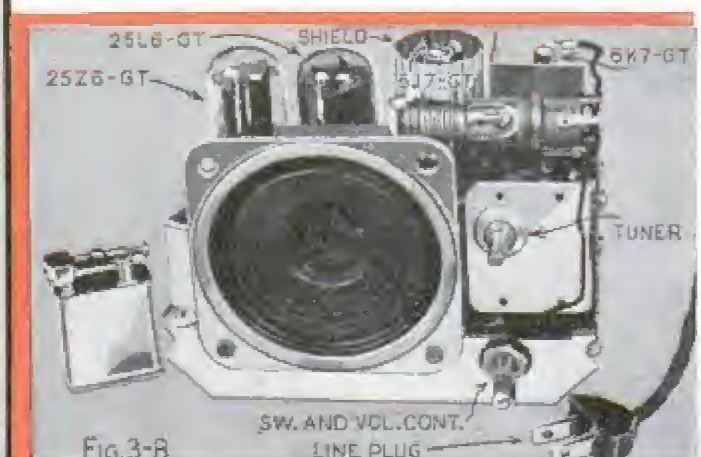
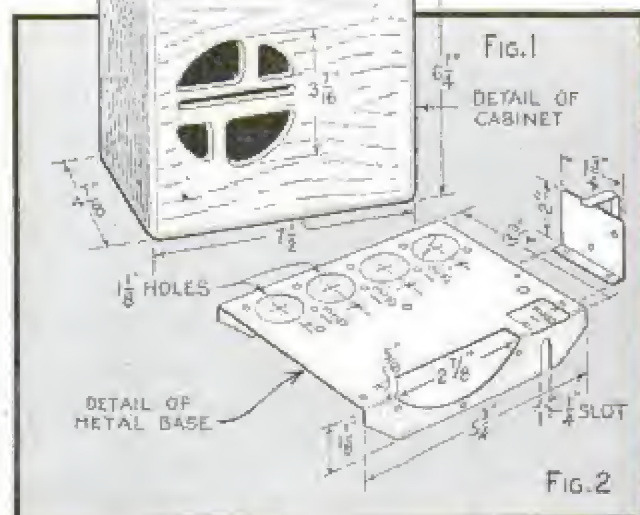
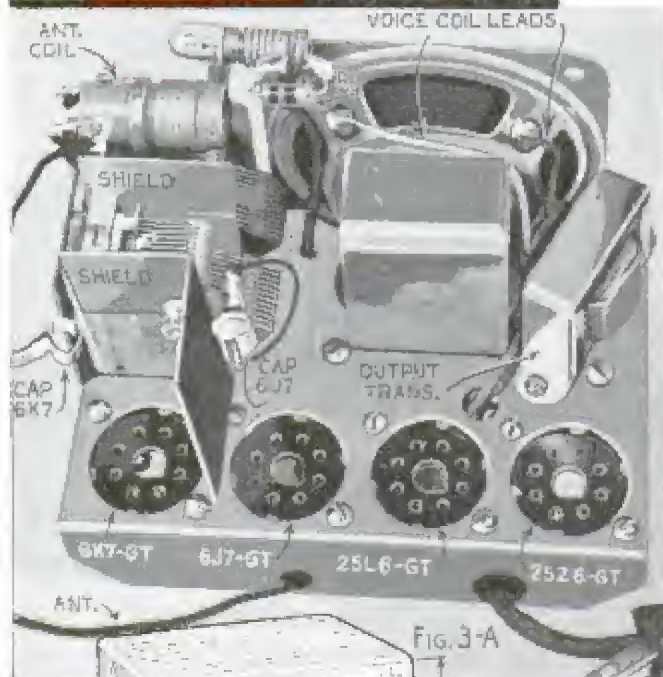
TINY BEAM-POWER SET



"BANTAM" space-saving tubes, which have all the good qualities of large similar standard beam-power types, make this miniature portable general-purpose broadcast receiver possible and give it a surprisingly loud and clear voice. These small type-GT tubes, shown in photo (B), cost no more than those employed in ordinary broadcast sets and are available from all radio-parts houses.

Suitable for use in practically every room in the house or out on the porch, this efficient 4-tube t.r.f. set is easy to build and all parts, including the formed and drilled base, cost approximately \$4.75 less tubes and cabinet. It will operate on any 110-volt 50 to 60-cycle a.c., or d.c. supply line, and delivers about 2 watts of audio power.

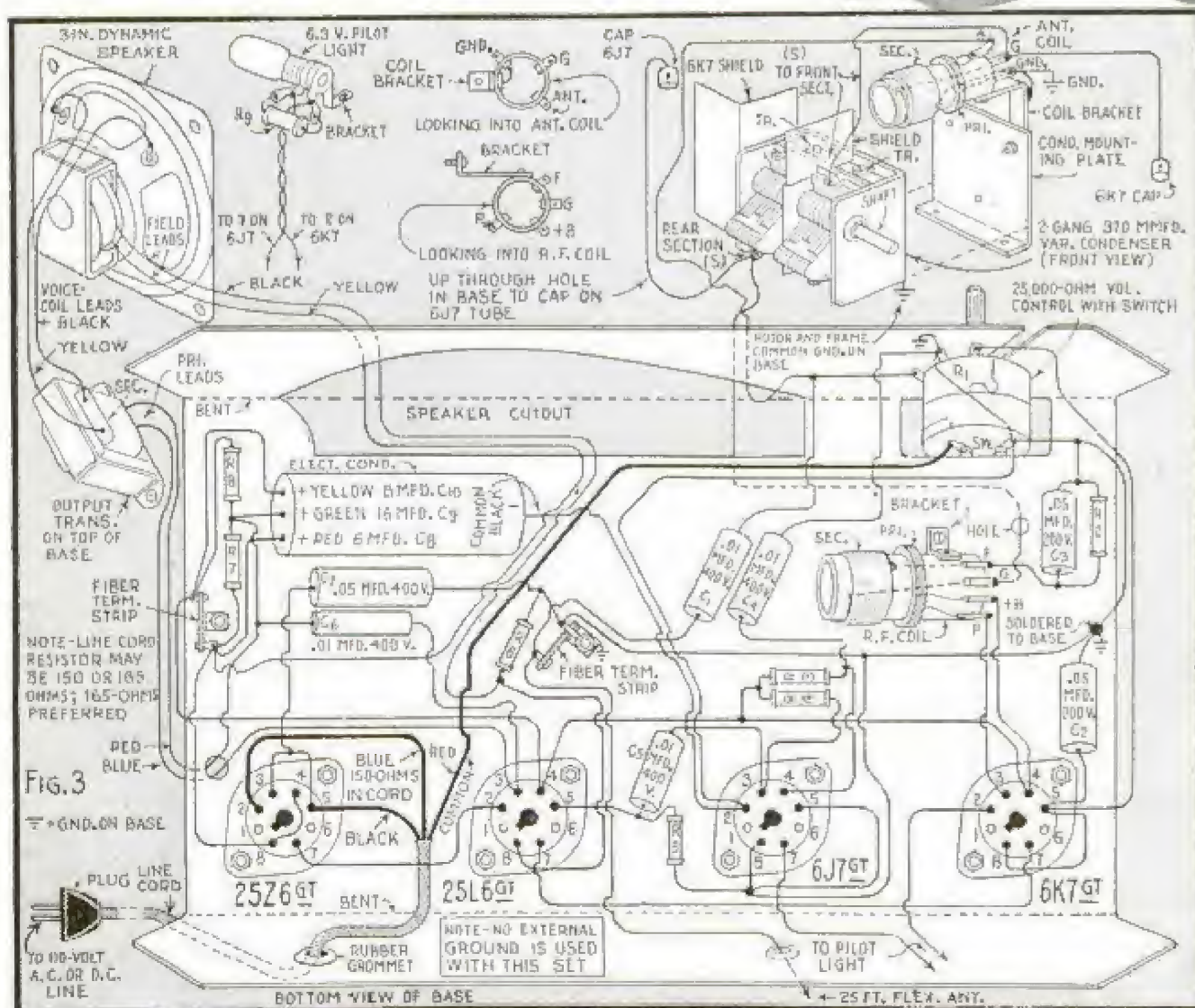
The cabinet and base details appear in Figs. 1 and 2, and the simplified wiring diagram is shown in Fig. 3. This wiring diagram indicates all connections under the base and each lead running up to the parts mounted above. A schematic circuit diagram is given in Fig. 4. Since the set is unusually compact, the parts must be placed correctly and in definite order. First install the four octal-type tube sockets and note the direction of the key pins. Mount the antenna coil and shield plate on the variable condenser and fasten it to the condenser mounting plate. Next attach the speaker to the base and then fasten the output transformer on the base after the voice-coil leads are soldered to the speaker lugs as indicated.



USES FOUR
Bantam Tubes

Now, working under the chassis base, slip the combination volume-control and switch into the slot provided and tighten the lock nut; next mount the r.f. coil in position indicated in Fig. 3, and then fasten the insulated terminal strips at the points shown. When wiring the set, follow the diagrams carefully, make all leads as short as possible and be sure that the soldered connections are tight. The order of wiring is not important, but it is usually best to connect the filament and power supply wires first. Photos Figs. 3-A, 3-B and 3-C give various views of the completed chassis; photo (A) shows the set housed in the simple plywood cabinet which is detailed in Fig. 1.

(Continued to page 130A)



Beginner's A.C.-D.C. Code-Practice Oscillator

By S. A. Walendowski



FIG. 1-A

ONLY a few radio parts are required to assemble this 1-tube self-powered audio oscillator. When hooked up with a key and inexpensive headphone it provides the beginner with an excellent means for code practice and will familiarize him with the actual tone of code signals. No batteries are necessary; merely plug the line cord into any 110-volt a.c. or d.c. outlet socket, flip the toggle switch "on" and the code teacher is ready for use. Follow the continental code chart given until memorized, then have some friend, an experienced operator if possible, send at a gradually increasing rate of speed until you are able to copy at least thirteen five-letter words a minute.

All parts are clearly shown, and the values specified, in the simplified wiring diagram Fig. 1, and photos Figs. 1-A and 1-B; a schematic circuit diagram appears in Fig. 2. The audio transformer is an ordinary 3½ to 1 ratio interstage type with terminal lugs out the bottom. Fixed condenser C_1 is a .1 mfd. paper by-pass type; C_2 and C_3 are 8 mfd. electrolytic filter condensers contained in a single metal container. Condenser C_4 is a mica type. The electrolytic condenser unit mounts in a hole cut in the metal base; holes are also cut for the 7-prong wafer-type tube socket and to clear the terminals of the audio

(Continued to page 132A)

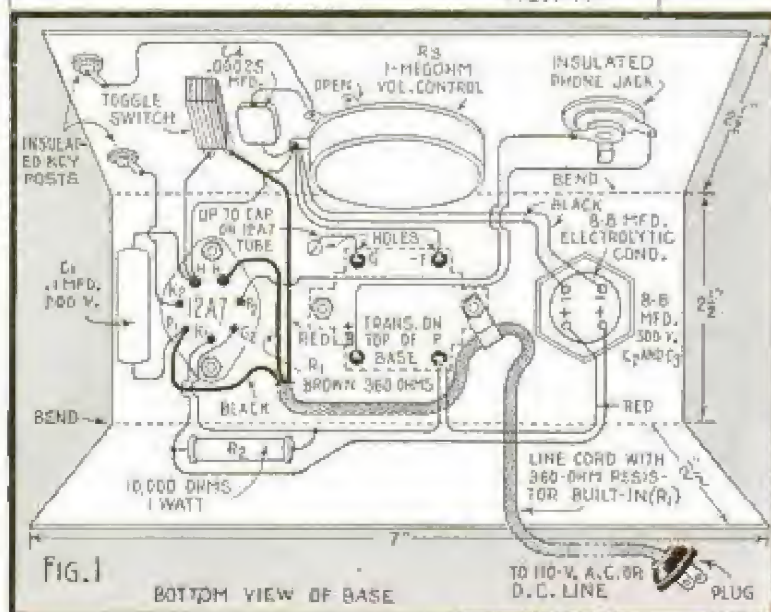


FIG. 1

BOTTOM VIEW OF BASE

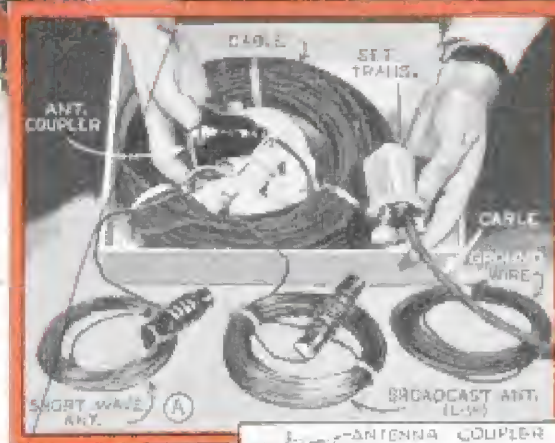


FIG. 1-B

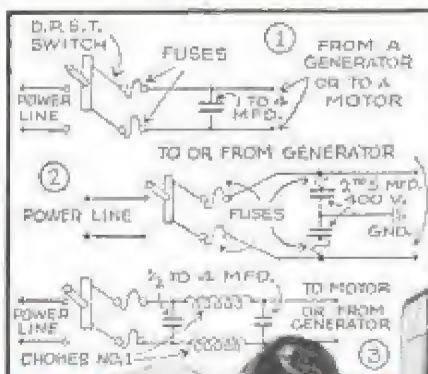
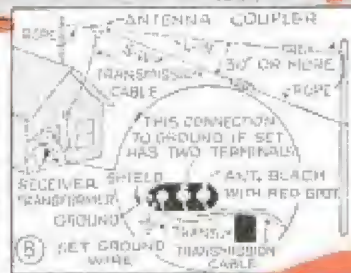
Practical RADIO SUGGESTIONS



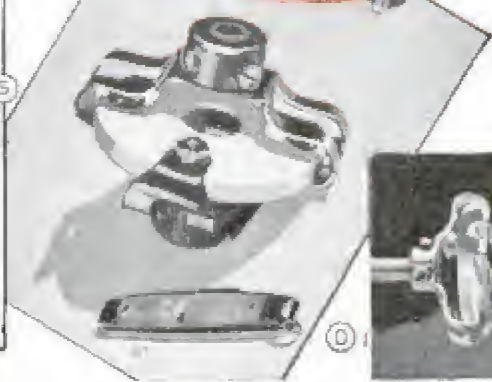
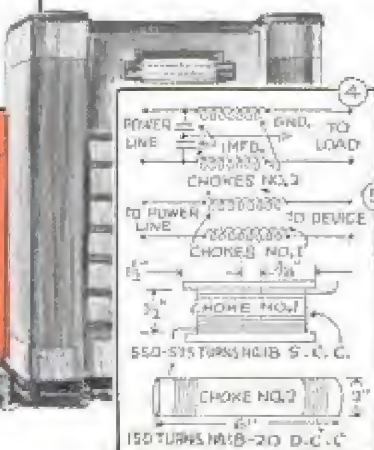
(A) and (B), any set owner can install this improved all-wave antenna system and take advantage of several advanced features that improve reception. Combining an "L" type broadcast antenna with a half-doublet for short waves, it employs shielded cable and iron-core transformers; comes completely wired



(C), pocket-type all-purpose test meter, designed for amateurs and experimenters, quickly locates flaws in receivers and transmitters. Checks a.c. or d.c. filament voltage, line voltage and transformer voltage on high a.c. ranges. Other tests include voltage on low and high d.c. ranges; also checks grid, screen and plate current of any tube. A copper-oxide rectifier is built into the meter for a.c. measurements and a battery for standard ohmmeter ranges. With its self-contained battery, this compact trouble shooter is also an excellent continuity meter



(D), flexible insulated shaft coupling permits tandem operation of condensers; Figs. 1, 2, 3, 4 and 5 are suggested applications for homemade interference eliminators. All No. 1 chokes are layer-wound on wood forms with wax paper between layers, each layer shellacked; No. 2 chokes are single-layer wound on cardboard tubing



Cardwell Mfg Co
81 Park Road, New York, N.Y.

Television Picture Attachment Uses Any A.C. Set for Sound



Utilizing the chassis and loud speaker of any a.c.-operated radio for accompanying sound, this table-model attachment reproduces television images for direct viewing. It plugs into your regular receiver in the same manner that you would connect a record player. The picture is 3 $\frac{3}{8}$ in. by 4 $\frac{3}{8}$ in. Five television receiving channels are provided.

Sending Sound over a Light Beam

Equipment found in most junior high schools can be used to transmit sound over a light beam for class demonstrations. A common flashlight is connected to the output of a radio receiver for the modulated



light source. The indicated phototube and amplifier of a sound movie projector convert the light signals into electric impulses that are amplified and released as sound by the loud speaker at right.

Dynamotor with Noise Filter

Operating on a 12-volt storage battery, this compact well-filtered power unit delivers up to 400 volts at 150 ma. Designed to power radio receivers and transmitters for aircraft, police and marine use, it is also suitable for mobile sound systems.



Radio Living Room of Tomorrow

Simple in arrangement, and soft in color because of television, the suggested "radio living room of tomorrow" at the New York World's Fair is open to visitors, who are



permitted to inspect the various sight, sound and facsimile facilities while they are in operation.

Blueprints covering radio construction articles in this and past issues are available for 25 cents each. Original material lists, with names of manufacturers and dealers, can be obtained from our Radio Department upon receipt of postage.

NEXT MONTH—How to Build a Two-Tube "Phantom" Record Player. A simple and inexpensive self-powered phono-oscillator for playing records or "home broadcasting" through your radio set without any wired connections between the phonograph pickup, or microphone, and your receiver; new "loktal-base" tubes are used.



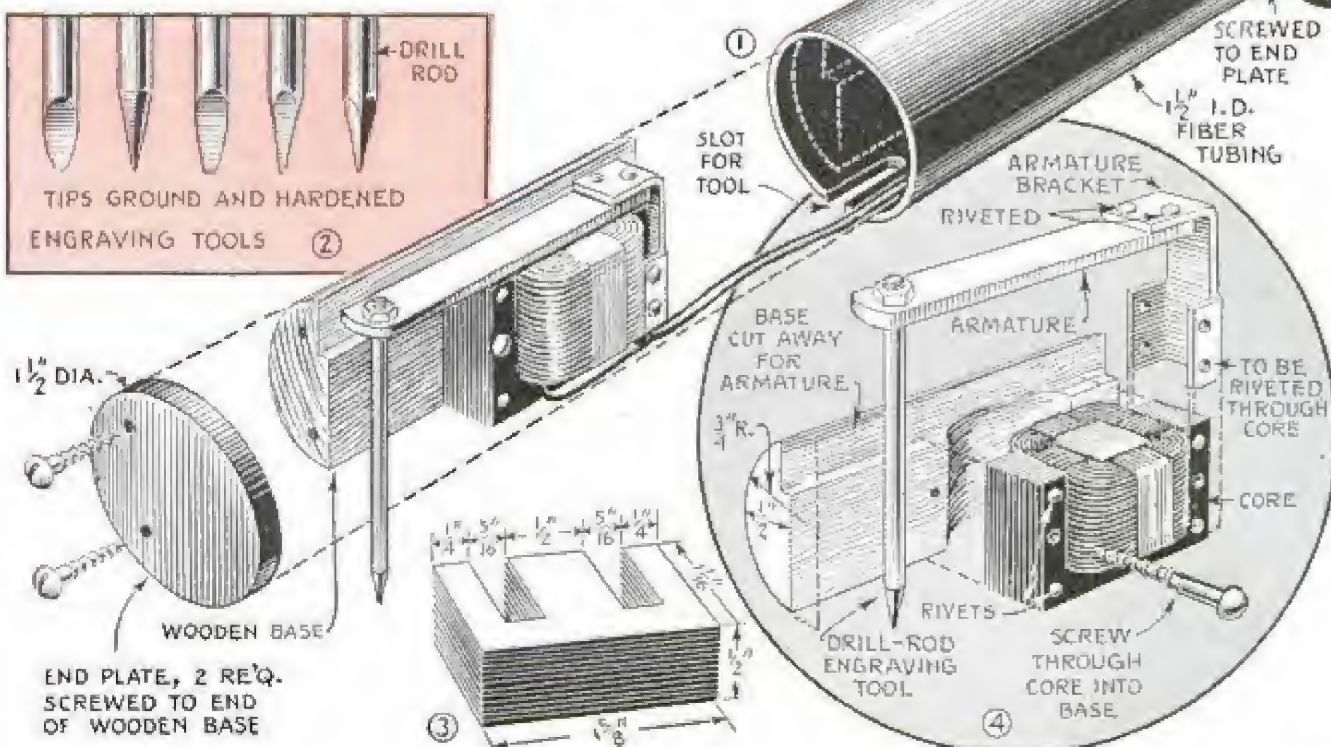
SHOP NOTES

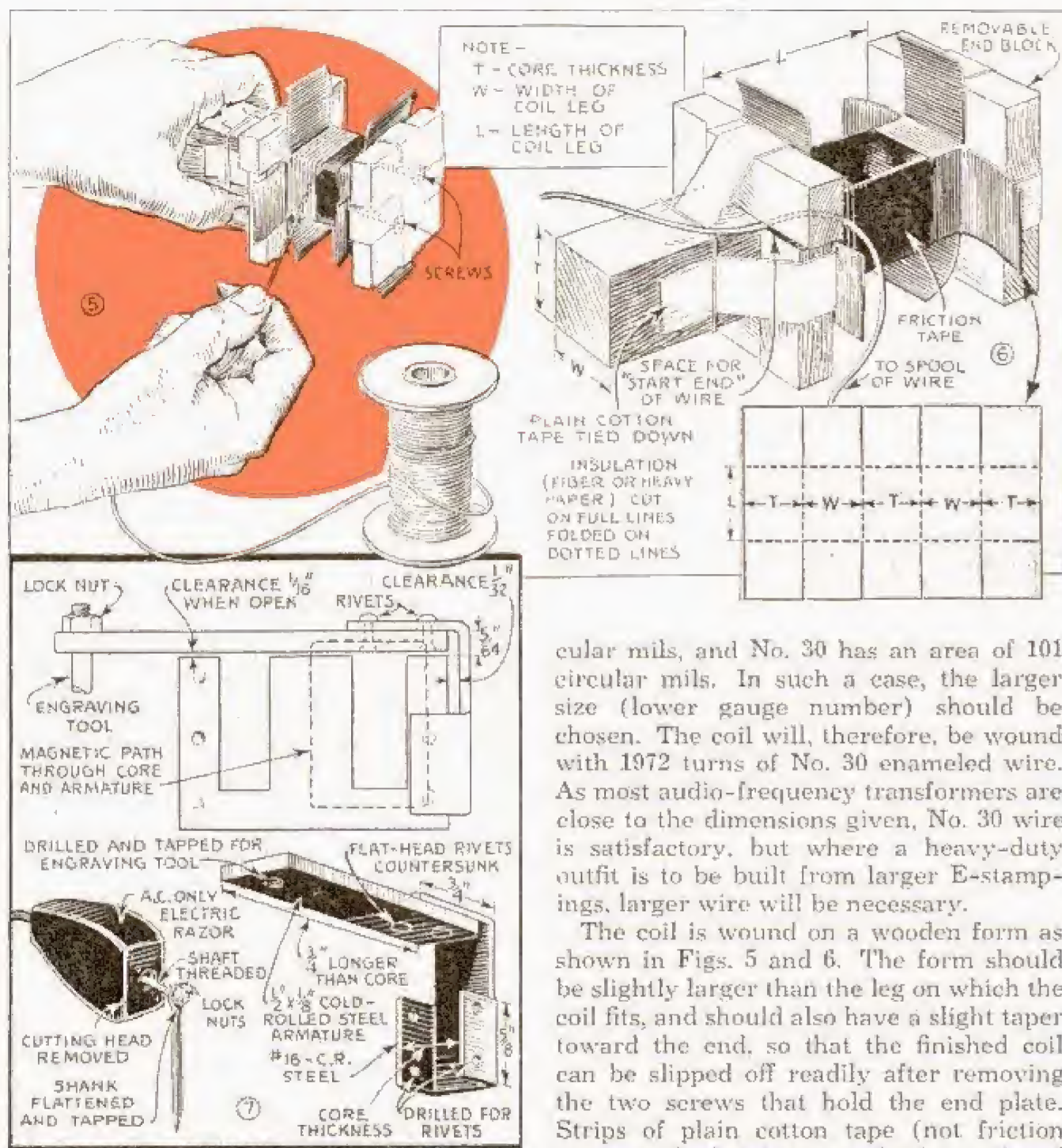
Electric VIBRATING "PENCIL" tools soft metals

By C. A. CROWLEY

THIS handy engraving "pencil" engraves name plates, initials tools, lays out metal templates, and is useful for tooling craft-work of all kinds. It operates on 110-volt, 60-cycle alternating current, and will not work on direct current.

An electromagnet is the heart of the tool. Its core consists of E-stampings from an old audio-frequency radio transformer, dimensions of which are shown in Fig. 3, although these are not extremely critical. The number of turns required for the coil is equal to 493 divided by the cross-sectional area of the core. The cross-sectional area of the core is the width of the center leg on which the coil is to be wound, mul-





cular mils, and No. 30 has an area of 101 circular mils. In such a case, the larger size (lower gauge number) should be chosen. The coil will, therefore, be wound with 1972 turns of No. 30 enameled wire. As most audio-frequency transformers are close to the dimensions given, No. 30 wire is satisfactory, but where a heavy-duty outfit is to be built from larger E-stampings, larger wire will be necessary.

The coil is wound on a wooden form as shown in Figs. 5 and 6. The form should be slightly larger than the leg on which the coil fits, and should also have a slight taper toward the end, so that the finished coil can be slipped off readily after removing the two screws that hold the end plate. Strips of plain cotton tape (not friction tape) are laid endwise on the four sides of the form, and then fiber insulation or heavy brown paper, cut to the pattern shown in Fig. 6, is laid over the form and held in place with a single band of friction tape. Wind the coil tightly and evenly, avoiding all kinks. When the coil is finished, tie the cotton tapes tightly over the coil and remove the coil from the form. Wrap a single band of friction tape around each side of the coil. The leads from the coil should be soldered to a suitable length of lampcord, and the soldered joints taped. Then the coil can be slipped on the core and held in place with a small wood wedge.

The armature assembly shown in Figs.

multiplied by the thickness. In the case of the core shown, the center leg is .25 sq. in. The number of turns required is, therefore, 493 divided by .25, or 1972.

The wire size is calculated from the length of the magnetic path, as shown in the upper detail of Fig. 7. The wire size in circular mils is found by multiplying the length by 50,000, and then dividing by the number of turns. For a magnetic path of 3 1/4 in., the wire size required is 3.25 times 50,000, divided by 1972, or 82.5 circular mils. The required gauge number is then found from any magnet wire table, which will show that No. 31 has an area of 80 cir-

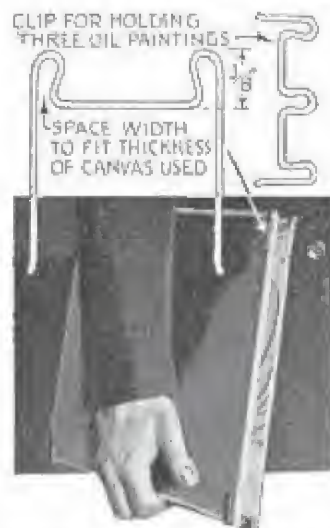
4 and 7 is constructed of cold-rolled steel. The armature is fastened to its bracket with two flat-head rivets, countersunk in the armature. Clearances and dimensions specified should be followed carefully.

Engraving tools can be made of $\frac{1}{8}$ -in. or larger drill rod. The tips can be ground to various shapes, as shown in Fig. 2. After rough-grinding to shape, the ends should be hardened by heating to a straw yellow color and plunging the cutting end only into cold water. After hardening they are finish ground. The shank of the tool can be threaded and screwed into the end of the armature; a lock nut and lock washer are used to hold them firmly. If only a single engraving bit is to be used, it can be held permanently in place by peening.

The completed tool can be mounted on a semi-circular wooden block, and placed inside a fiber tube. See Figs. 1 and 4.

Another way to make a simple engraving tool is to take an inexpensive vibrator-type (labeled a.c. only) electric razor, of the kind which contains an electromagnet instead of a motor. See the left detail of Fig. 7. Remove the cutter head from the shaver and, if necessary, saw off the end of the Bakelite case. An engraving tool can be attached to the vibrating shaft of the shaver. One way to do this is to swage the shank of the tool flat, and drill it to fit the shaft. It can be held in place by peening, or the shaft can be threaded and the tool tapped and held with a lock nut.

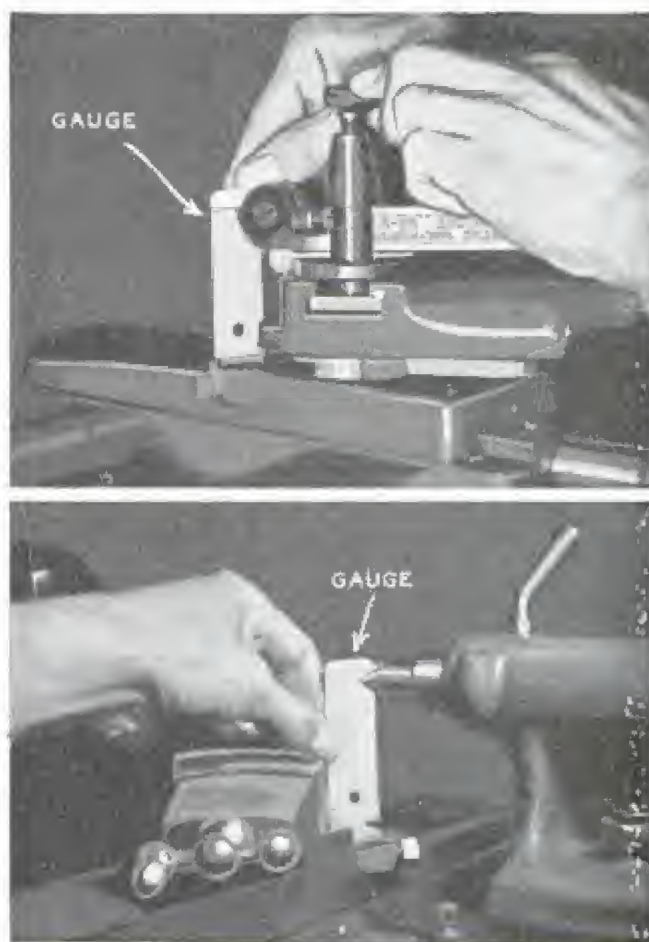
Wet Oil Paintings Held Apart by Spring Clips



wrapped and carried without fear of anything touching the wet surface.

Artists who have occasion to carry wet oil paintings will find these spring clips just the thing to keep them from smearing. Four clips bent from spring brass to the shape indicated clamp onto the edges of two canvas boards. In this manner paintings can be

Gauge to Center Threading Tool on Lathe Work



When threading or turning large work in a lathe where it is sometimes difficult to set the tool in the center of the work, this gauge will help. It is nothing more than a piece of metal about 1 in. wide and 6 in. long. I use the back of the compound rest as a reference point, set the gauge on it and file a shoulder where the point of the tailstock touches it, as shown in the lower photo. When setting the tool, just set the gauge on the compound rest and adjust the cutting point of the tool against the shoulder—C. Spiller, Los Angeles, Calif.

Tags Identify Seed Corn

One farmer uses milk-bottle caps to identify ears of seed corn. The necessary data are written on the cap in ink, then a nail is pushed through the cap into the end of the cob.



Bottle Caps on Block Grip Soap When Scrubbing Floors

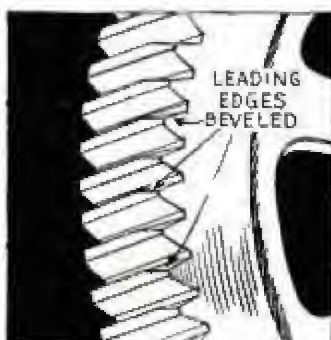


Desiring to apply soap directly to stained portions of a floor while scrubbing it, a janitor of a large building cut the bristles from a scrub brush and tacked a number of bottle caps to it. With this improvised handle, the soap bar was firmly gripped while rubbing it over the floor.

Modeling Clay Cleans Typewriter

Modeling clay such as sold in toy sections of department and ten-cent stores is good material for cleaning typewriter keys. Press it on the keys firmly and you will find that it will pull out all the accumulated dirt. The clay is also suitable for removing dirt on other machines.

Machines Thrown in Gear Easily When Teeth Are Beveled

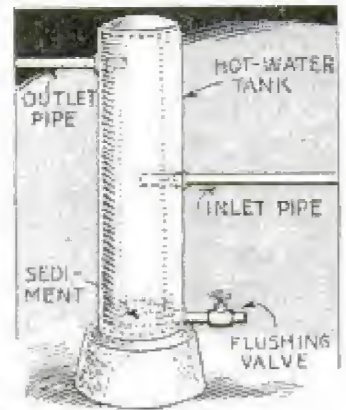


Trouble sometimes experienced in shifting certain machines into gear, such as ice-cream machinery, slicing machines, etc., can often be avoided by slightly beveling the ends of the

teeth on the sides that engage with other gears. The beveled ends of the teeth tend to mesh with those on another gear more easily than when the ends are flat.

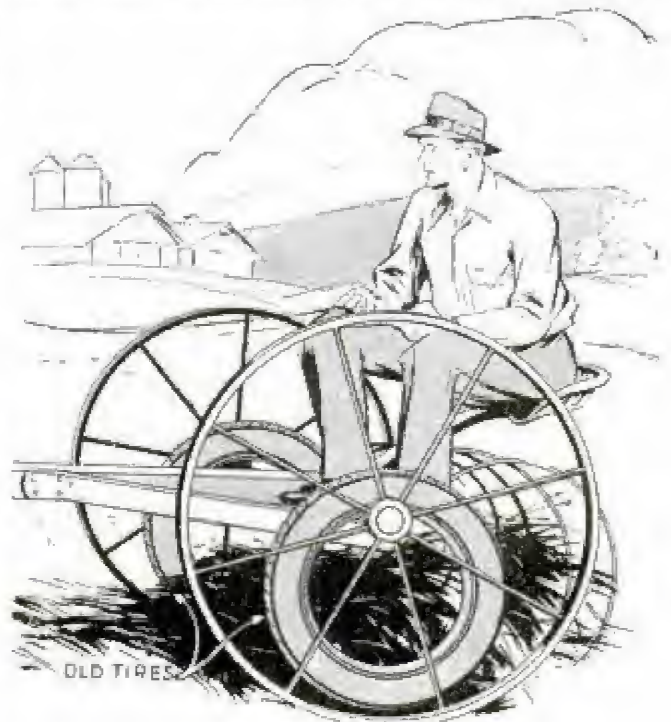
Settling Basin in Photo Studio Filters Washing Water

Handicapped because fine particles of sand worked through the water lines and made ferrotyping and other operations difficult for fine work, the owner of a small photographic studio overcame the trouble by using an old hot-water tank as a settling basin. Water entered the tank halfway up from the bottom and was taken off for the studio from the top. The sediment was periodically removed by draining off some of the water through a valve at the bottom of the tank.

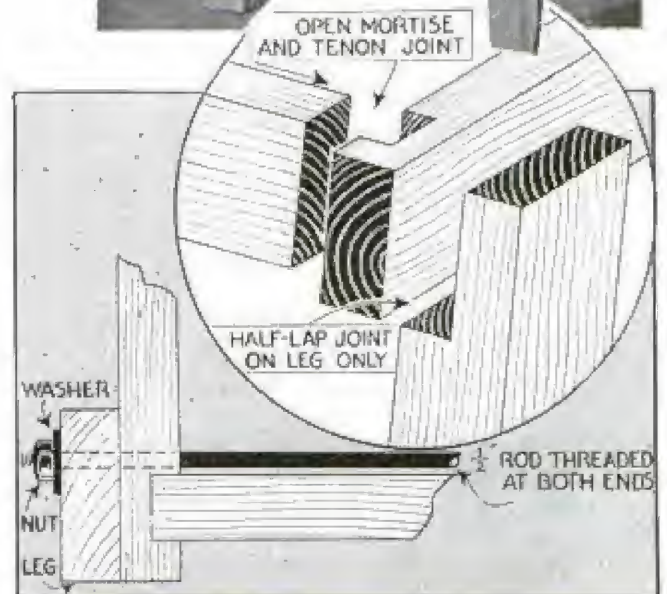
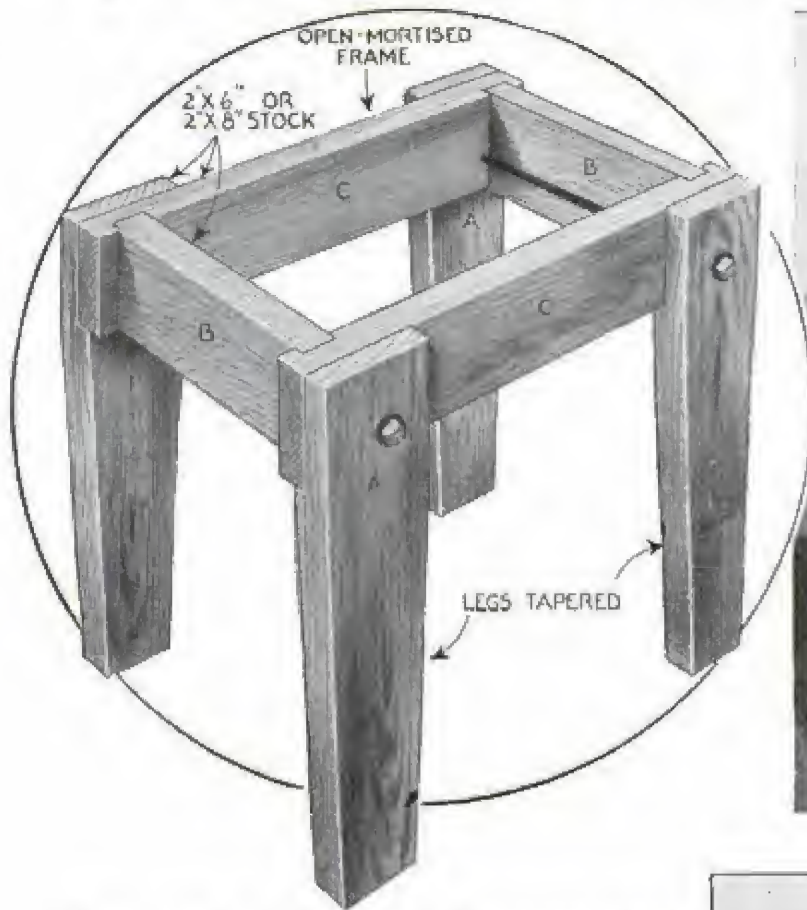


Keeping Hay Out of Rake Wheels with Old Auto Tires

Annoyance caused by wisps of hay twisting and binding around the axles of your rake, can be eliminated by slipping old tires over the axles to ride inside the hub.



"Squeeze" Joints Make This Saw Bench Rigid



When you build a stand for your saw table or a low bench that must take real punishment, rigidity is the one thing you're after. This bench can be made any reasonable size and the strength of the joints at the four corners is equal to the strength of the stock of which the bench is made. No glue or screws are used; just two long rods, threaded at each end, are all you need to assemble it. The saw bench shown in the photo was made of 2 by 6-in. yellow pine and the joint shown in the circular detail is the same at all four corners. Legs, A, are halved onto the lengthwise rails C. Cross rails B are housed into the lengthwise rails and when the nuts on the

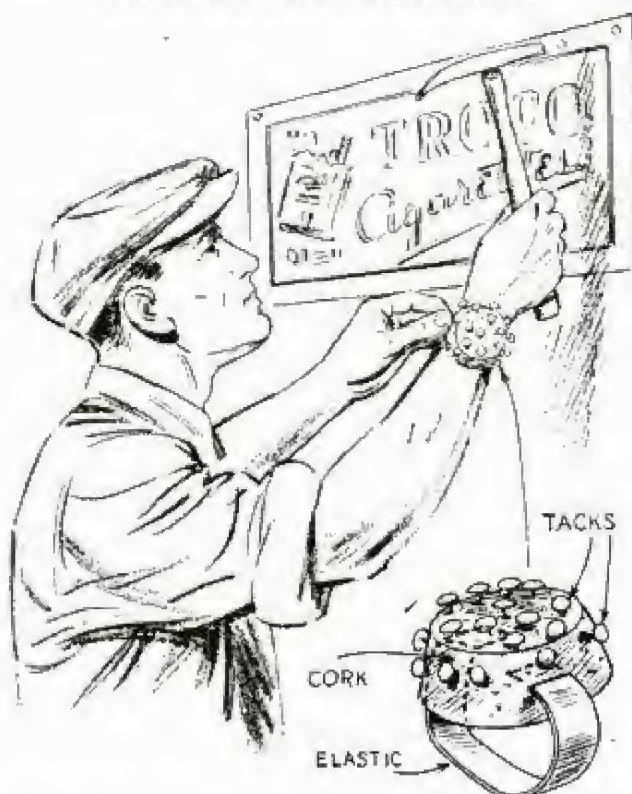
ends of the threaded rods are tightened these parts are drawn together tightly.

Adjusting Your Cream Separator to Get All the Butterfat

Cream separators of the centrifugal type may be the cause of considerable loss of butterfat if operated to bring the highest possible test of cream. One cream-station operator says it is the aim of his patrons to deliver cream of the highest possible butterfat content, in the mistaken opinion that it is more profitable. According to this operator, a hand-power separator cannot

be driven fast enough to bring about complete separation of the cream from the milk when the cream screw is turned down to bring a test of much more than 35 per cent butterfat. If the screw is opened wider so that the test falls to 30 per cent, there will be more skim milk in the cream delivered but there will be little if any butterfat lost in the skim milk.

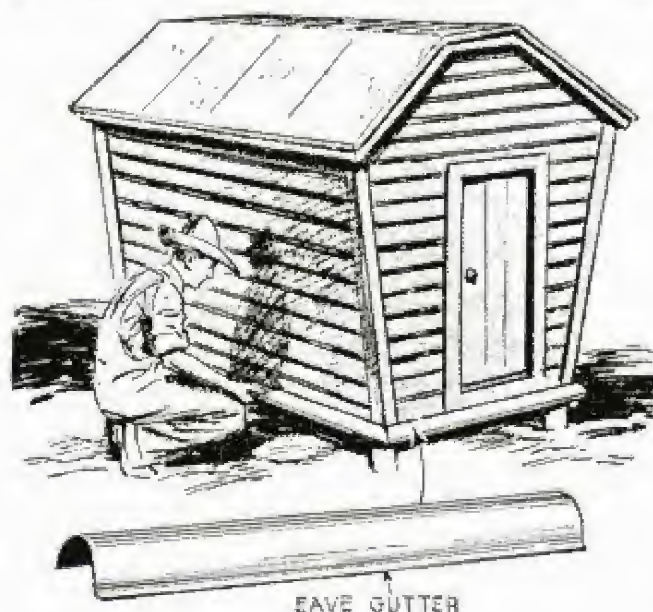
Bill-Poster's Tacks Are at Hand in Cork on Wristband



Slipped over your wrist, this holder keeps tacks right where you need them when putting up posters. It consists of a large cork fitted with an elastic wristband, the ends of which are cemented in slits cut in the cork with a knife.

Corn Crib Shielded Against Mice with Eave Gutter

Inverted and nailed along the lower outside edge of a corn crib, lengths of eave gutter will make it impossible for mice and



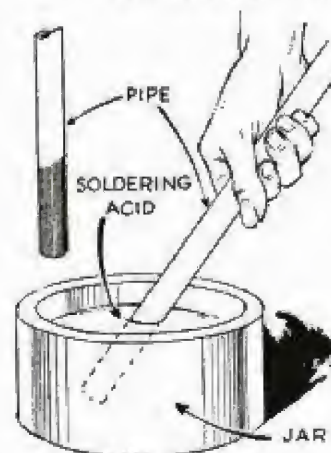
rats to climb into the crib. Give the gutter a coat of red lead and when dry, paint it to match the building.

Artist's Brush Cleaned on Screen in Lid of Jar Cover

A suitable surface for cleaning art brushes consists of a screen-wire disk soldered in the cover of the brush-cleaning jar. The disk should be cut slightly larger than the inside of the jar cover so that it will take a convex shape when it is forced into place in the cover.



Pipes and Tubes Dipped in Acid to Mark Cutting Angle



Having many occasions to cut lengths of galvanized pipe and tubing at various angles, one tin-smith marked the lines for easy and accurate cutting by merely dipping them into a jar of soldering acid and then thoroughly rinsing in water. Galvanized coatings subjected to the acid turn black, providing a clearly defined edge to show where the work is to be cut.

Carbon Copy on Back of Letter Saves Filing Space

Many large offices are making carbon copies of answers to letters on the backs of the original letters. Thus, the blank space on the reverse side of incoming letters performs the triple service of supplying paper for carbon copies, eliminating clips or stapling, and greatly increasing the amount of space available in the files.

—John G. Roberts, Chicago.

ELECTRIC WIRING *in the* HOME

PART II

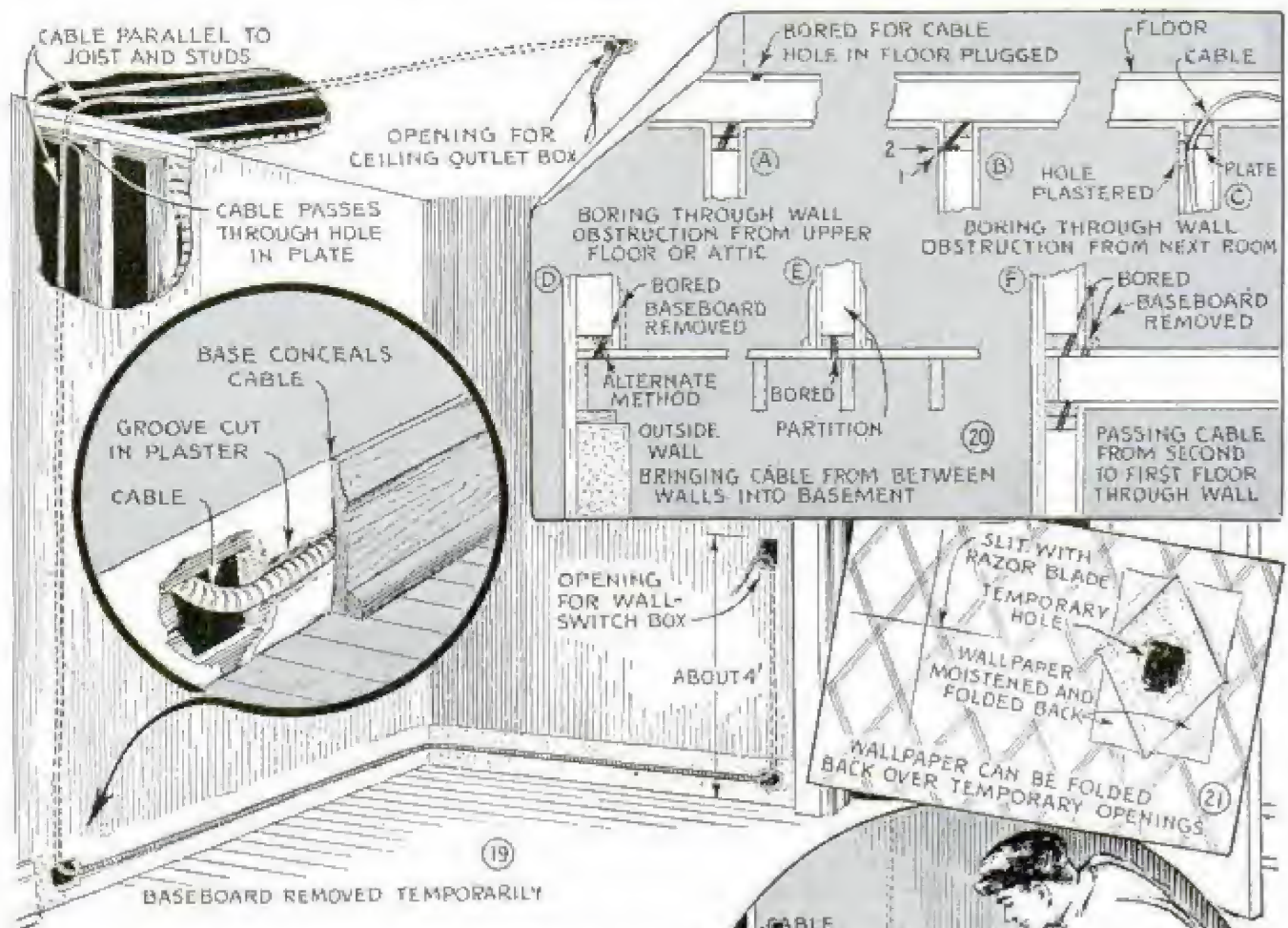
Installing the Equipment

ALTHOUGH the switch and outlet boxes are not installed until after the cables have been pulled through partitions and floors, it will be necessary to locate the exact position of the switch and outlet boxes first, and then to make the wall and ceiling openings. In this way the cables can be pulled from one opening to the next, and the ends of the cable left extending from the openings for later testing and subsequent attachment of the boxes.

Openings for Outlet Boxes: Switch boxes may be used singly or a number of them can be combined side by side which is called "ganging." In the latter case the sides of the boxes are removed and the remaining portions attached together to form a single large box. Whether the wall opening is to accommodate one switch box or a number of them, the procedure of cutting an opening just large enough, and no larger, is the same. First locate the approximate position between two studs, carefully drill a hole in the wall and remove just enough plaster to find the opening between laths. Then, mark the outline of the box on the wall with a pencil so that one lath will cross the center. Then, with a hacksaw blade, carefully cut out a section of this lath along the pencil marks and saw into the adjacent ones just enough to form a hole to take the box, Fig. 14, so that the small tabs at the top and bottom of the box can be screwed to the uncut portions of lath. The hacksaw blade should be used so that it cuts on the pull stroke.

To install a ceiling outlet box, the most common types of which are shown in Fig. 16, use a bar hanger of the type shown in Fig. 17. A wire is fastened to the movable stud and the bar is pushed through a hole in the ceiling, after which the wire is used to pull the stud back to project through the opening. The hanger is turned so that the bar lies across the lath, which will distribute the load. The outlet box is to be attached to this stud as in Fig. 16. The box may or may not be countersunk in the





plaster, as shown, depending on the size of the fixture canopy.

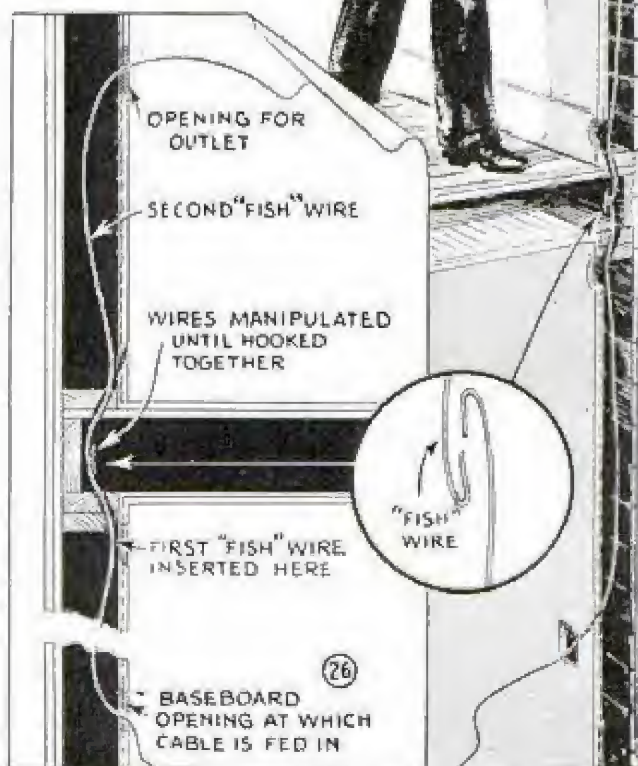
Installing Cable: It is easy to pass a cable from point to point when there is a clear space between joists or studs extending all the way from one outlet to the next. Another simple job is to install a wall outlet on the first floor, as you can usually drop the cable down into the basement where it is connected to the nearest outlet box. But where the cable must cross studs as in Fig. 19, you can either drop into the basement or you can run the cable behind the baseboard, removing plaster to form a groove for the cable. To drop the cable into the basement you will have to pass it through the partition plate. Two methods of doing this are shown in details D and E of Fig. 20. To pass the cable through partition plates at the ceiling as in Fig. 19, it may be possible to drill this hole from above, as in detail A of Fig. 20. The hole can be plugged later. Otherwise the method shown in details B and C, Fig. 20, can be followed. To do this, first slit the wallpaper as in Fig. 21, fold the paper back and make a hole large enough so that you can insert the bore at an angle to go through the plate. Then drill a second hole straight

across at the bottom but only partly through the sill, after which the cable can be passed through the plate easily as in detail C of Fig. 20.

When passing a wire from one floor to another, it may be necessary to go through a sill and plate as in detail F of Fig. 20. When encountering other forms of obstructions, it is sometimes possible to run the cable exposed through attics, and in closets where exposed cable is not objectionable. For example, Fig. 22 shows a cable run around the obstruction that was drilled through in detail F of Fig. 20. In

some cases the baseboard can be removed and the cable can be hidden behind it where it comes up through the floor, making it even less noticeable.

In pulling cables from point to point, you will find a "fish wire" handy. This is first passed through the channel and then the attached cable is pulled through. Any fairly stiff wire will be suitable. In some cases it is necessary to use two lengths of fish wire as in Fig. 26. In this case one length is pushed into the opening at the ceiling and pulled out at the baseboard opening. A hook is formed on the end of this wire and pushed up through the hole in the sill. A hook is also formed on the end of the second wire, which is pushed down from the top. The two wires must be hooked together, which may require some effort and patience. Then by pulling at the upper outlet and guiding the wire at the other openings, it is possible to pull the hooked joint out at the top, which leaves a continuous length of wire between outlets. Besides



the use of fish wires, ordinary furnace chain is useful for pulling up wires through partitions. It is dropped down from an upper opening and the lower end is pulled through sill holes by means of short wire hooks, after which the wires of the cable are attached and the cable is pulled up.

A length of cable long enough to reach from one outlet to the other, with a couple of feet surplus, is cut next. The manner of cutting BX is shown in Fig. 25. Non-metallic cable is cut with a sharp knife. The wires are cut with a pair of side-cutting pliers. The end of the cable is fastened securely to the end of the fish wire and it is then fed in at one opening while the wire is pulled at the other opening and guided at temporary openings between the two. The entire cable is pulled in leaving only about 8 or 10 in. for connections at the outlets.

Connecting Cable to Boxes: After all cables have been located and their ends project from the holes, the switch and outlet boxes are installed. Each box has a number of "knock-outs" and the required number of these must be removed by striking them with a ball-peen hammer.



Then the cable covering is removed about 8 in. from the end. Do this carefully to avoid damage to the wires which are left extending. Now fit a connector to the cable and attach to the box as in Fig. 28, driving the locking nut home with a screwdriver as in Fig. 27. Before a switch box is screwed to the lath, the tabs on the top and bottom are adjusted so that when fastened in place, the front edges of the box will be flush with the surface of the wall.

Splices: As all connections are made within outlet boxes, there will be no great strain on splices, except in the case of drop lights. For all connections but drop lights, use the pigtail splice shown in Fig. 24, although this can be used also for drop lights if strain on the splice is relieved by tying an underwriters' knot in the drop cord, Fig. 29. The knot rests on the bushing of the outlet-box cover and takes the strain.

Testing: Before soldering splices, and before attaching fixtures, switches, or wall outlets, the circuits must be tested. With the main switch off, connect two or three dry cells in series to the new circuit. A

buzzer with two lengths of wire attached is used. When touched to the two wires which are to be attached to a wall outlet or to any outlet not controlled by a switch, the buzzer will operate. When connected to the wires for a fixture controlled by a wall switch the buzzer should not work unless the two wires for the switch are touched together. If three-way switches are used, all three of the wires should be connected together at each switch. Test three-way switches also with separate wires. If one lead is connected to the "hot" wire and the other to any grounded object (water pipe, radiator, etc.), the buzzer should work. If the buzzer is connected to a grounded wire and to a grounded object, it should not buzz. If BX is used, the metal tube and all outlet boxes are grounded, and they should be tested in this way. If the buzzer operates when it is not supposed to, it indicates a short circuit at some point. If it does not work when it should, it indicates an open circuit (a broken conductor or faulty connection).

Soldering and Taping Splices: All splices must be made mechanically and electrically sound, and they must be soldered and insulated in a manner equal to the original insulation. The copper wires must be scraped or sanded clean before joining. After testing, rosin or non-corrosive paste soldering flux—not acid flux—is applied

and the wire is heated with a blowtorch or a hot soldering copper. Then wire solder, either plain or rosin-cored, is applied to the hot joint. If properly performed, this operation will give a perfectly tight and secure joint that will not loosen. The soldered joint is next wrapped with rubber tape as shown in Fig. 24. First fold a short length over the tail of the splices. Then wrap the splice spirally with rubber tape, starting from the insulation on one wire and overlapping the turns, completely covering the bare wire with rubber as thick as the original insulation. Finally wrap the whole splice with friction tape in the same manner, applying two layers to complete the splice.

Attaching Fixtures: Switches, wall outlets and fixtures are attached next. If the screws for attaching the wires to the device are of different colors, the silver colored one is to be attached to the white wire and the brass colored one to the black wire. In the case of lighting fixtures which come wired with lampcord, one of the wires will probably have a tracer thread of a distinct color woven into the insulation. This is to be connected to the white or grounded wire in the outlet box. Large ceiling fixtures generally employ a "hickey" which attaches to the stud in the outlet box and also to the stem of the fixture. See Figs. 18 and 23. A canopy sliding up and over the stem conceals all connections. Small fixtures may be fastened as shown in Fig. 17, by means of a strap screwed to the box or to the stud, and to which the fixture itself is screwed.

Finishing: To finish the job, flush plates are installed over all wall outlets and switches. Bakelite plates in a variety of colors are generally used, although mirror or metal plates are also available. All temporary openings should be plastered over with patching plaster, which is available at any hardware store.

Baseboards and molding that were removed should be nailed to the studs, not to the lath. Holes in the floor should be plugged. A plug of the same kind of wood should be used as a rule, but in an inaccessible place, a cork held in place with shellac is often satisfactory. Finally, wall-paper that has been removed should be pasted back and any place where paint has been damaged should be touched up.

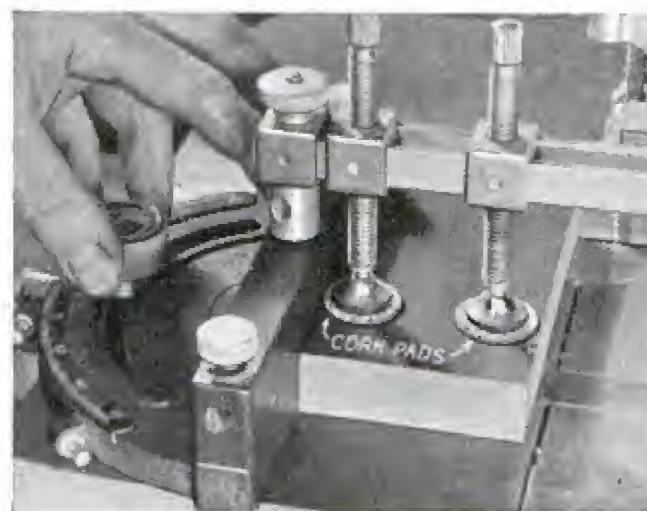
Shovel Board in Wagon or Truck Saves Time and Labor



When hauling corn, coal and similar material and you have no regular drop end-gate, set a wide board in the wagon or truck box as indicated. When shoveling off the load, the board will enable you to slide the scoop under the material.

Cork Pads on Miter-Gauge Clamp Prevent Marring Work

Cork disks taken from discarded bottle caps make excellent pads for the miter-gauge clamps of a circular or band saw. The disks, which are glued to the ends of the clamp screws, prevent marring the work and improve the holding qualities of the clamps.



Box for Dispensing Horse Feed Hooks over Manger



Instead of setting his feed-dispensing box on the floor and then stooping to measure out portions for each horse, one farmer nailed horseshoes to the box so it could be hooked over the mangers. A pair of horseshoes also serve as carrying handles.

Hose Shields Ground Wire

When running a wire to the ground from an electric line extending to a farm, some means should be provided to keep live stock from rubbing against it. In one case, a length of old garden hose was split along one side and slipped over the wire where it was held by large staples.

Grinding Taps to Get Threads That Fit Snugly



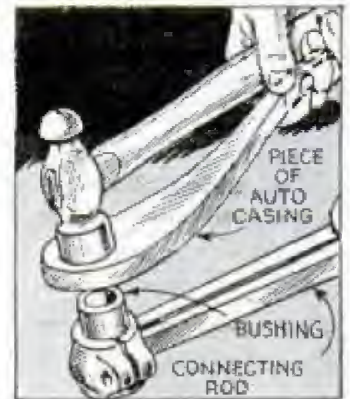
Workmen who experience trouble in machine-tapping holes to snug fits will find that by honing the taps slightly they can do better work. Use a small 60° hone of triangular shape and about the size of a lead pencil. Press one edge very lightly against the slowly rotating tap at the cutting end and

allow it to travel upward, following the thread spiral. Repeat this operation one or two times, starting at the lower end each time. This has a tendency to dull the tap, and if carried to extremes, will sacrifice quality and finish of the thread for whatever advantages have been gained in size, and may ruin the tap.

—N. Ballard, Oakland, Calif.

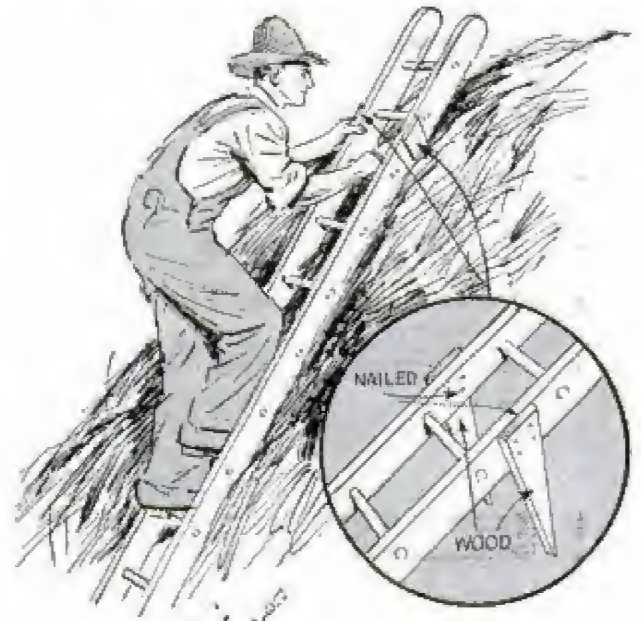
Emergency Pad to Drive Bushings Cut Out of Auto Tire

For driving a bushing or pin when a soft hammer is unavailable, cut a piece from an old auto tire to the shape indicated to serve as a cushioning pad. Grip both the pad and hammer in one hand, and you will find that the natural spring of the pad tends to keep it against the hammer head as the blow is struck. If both hands are free, you can hold the pad with one.



Non-Slip "Spikes" on Ladder Make Climbing Safer

Difficulty of climbing a haystack is lessened if you use a ladder with wooden spikes near the upper end. These project downward and are stuck into the stack, holding the ladder firmly in position.



CHAIN CARE..

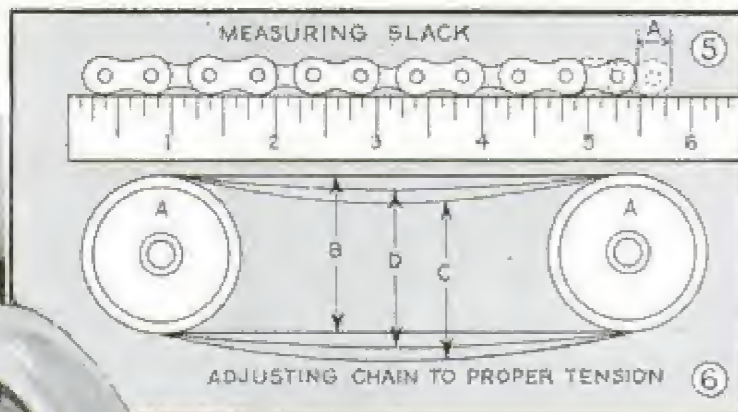
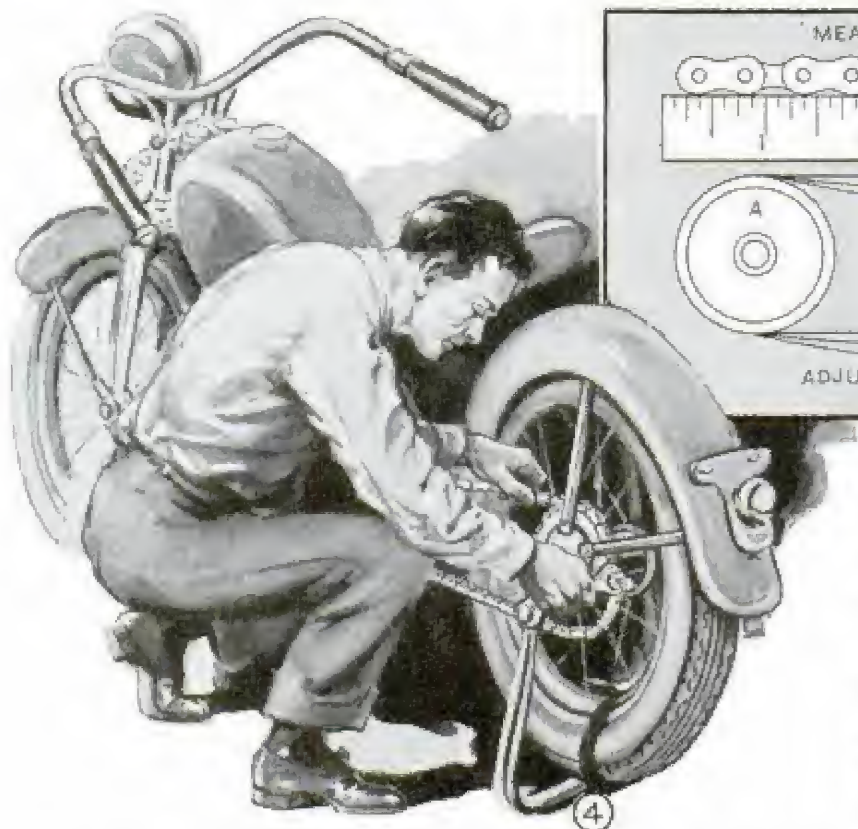
Periodic cleaning and greasing of roller-chain drives on bicycles, scooters and motorcycles practically doubles the life of the chain

ORDINARILY a roller chain is simply allowed to take care of itself until it wears out and is finally discarded. Just how long the chain lasts under this sort of care, or the lack of it, depends on the conditions under which it operates. Grit and dirt greatly accelerate wear under a given load and where the chain operates in the open without a cover it is very apt to collect abrasive material from other sources. Hence, merely putting oil or grease on a chain that is exposed to dusty operating conditions can hardly be recommended, because the oil that does remain on the chain simply gathers a greater amount of foreign material to eventually work into the bearings. For this reason a comparatively dry lubricant should be used. Of course, a chain that has been in use for some time will need a thorough cleaning to remove the last traces of dust and grit before there can be any effective lubrication where it is most needed.

First, wash the chain thoroughly in gasoline, Fig. 1, then coil it and place in a large flat tin such as a bread tin or the bottom portion of a 5-gal. oil can, Fig. 2. Fill the tin with just enough graphite grease to cover the chain completely. It is best to use graphite grease because the latter forms a surface on metal which is to a certain extent not only self-lubricating but also encourages the distribution of oil—two properties which are of great value where the chain is intermittently lubricated. The grease is heated over a gas plate until it is thoroughly melted and then is allowed to cool. This is repeated two or three times, allowing to cool each time. Alternate heating and cooling tends to draw the grease well into the bearings. Watch the heating process carefully for if the grease is allowed to become too hot there is not only danger of fire but the temper of the chain is likely to be drawn.

A chain that is run either too loose or





too tight will be noisy and cause a loss of power. It should be kept adjusted so that there is approximately $\frac{1}{2}$ in. of slack in its middle run. Fig. 6 D shows the proper amount of slack in approximate proportion to the run and relative size of sprockets, A. Fig. 6 B and C show the extremes, too tight

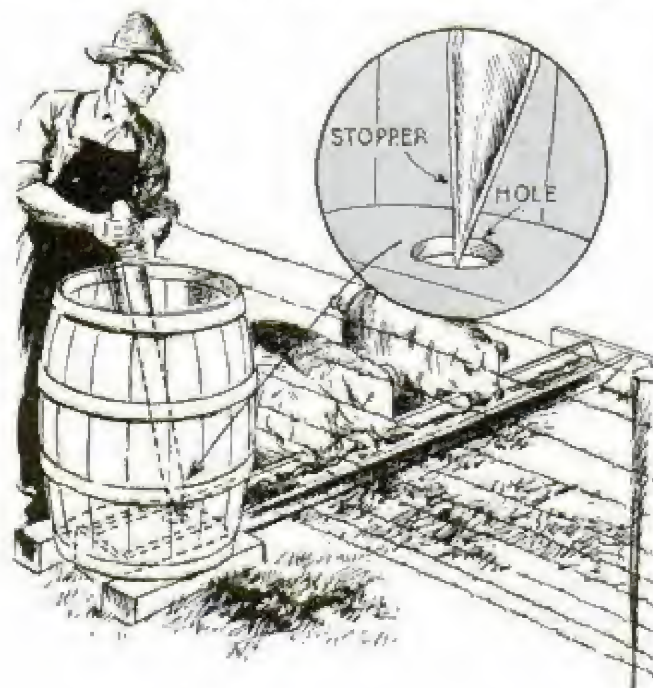
and too loose. Either condition causes wear and noise and in the latter case may cause the chain to "climb" the sprocket.

The usual procedure of pulling the chain away from the sprocket to detect wear is not always reliable. Fig. 5 shows a surer way. When a 5 or 6-in. length of chain shows a "stretch" of $\frac{1}{4}$ to $\frac{3}{8}$ in. as indicated at A, the chain should be replaced. If the sprockets are badly worn replace these also, before you put on the new chain. Then be careful to aline the sprockets properly as in Fig. 4, otherwise the chain is likely to bind slightly and cause loss of power and undue wear.

Swill Barrel Empties into Trough Directly without Dipping

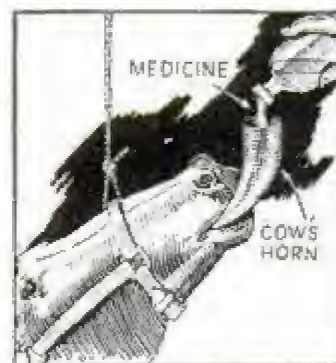
To avoid the messy chore of dipping swill from a barrel for his hogs, a farmer located the trough so that one end project-

ed outside the fence and elevated the barrel over it. A hole in the bottom of the barrel was provided with a long-handled stopper, which also served as a stirring rod, so that the liquid could be turned into the trough as needed, the stopper being lifted or dropped into the hole.



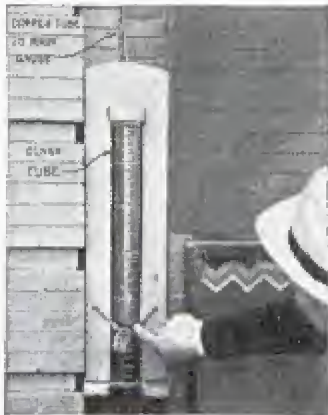
Horse Is Drenched Easily with Cow's Horn

Instead of administering medicine to horses forcibly — drenching — with a glass bottle, which might break in the animal's mouth, one farmer uses a cow's horn, with the tip sawed off.



Store Advertises with Rain Gauge

A Nebraska druggist advertises in a novel manner with a rain gauge. The gauge proper is placed on the roof, and rain water falling into it runs down a copper tube into a 2-in. sealed glass tube fastened against the side of the building just above the sidewalk. Graduations are etched on the side of the tube to correspond with those on the gauge. In this way, when an inch of water falls into the gauge on the roof and runs down the copper tube it shows as an inch of water in the glass.

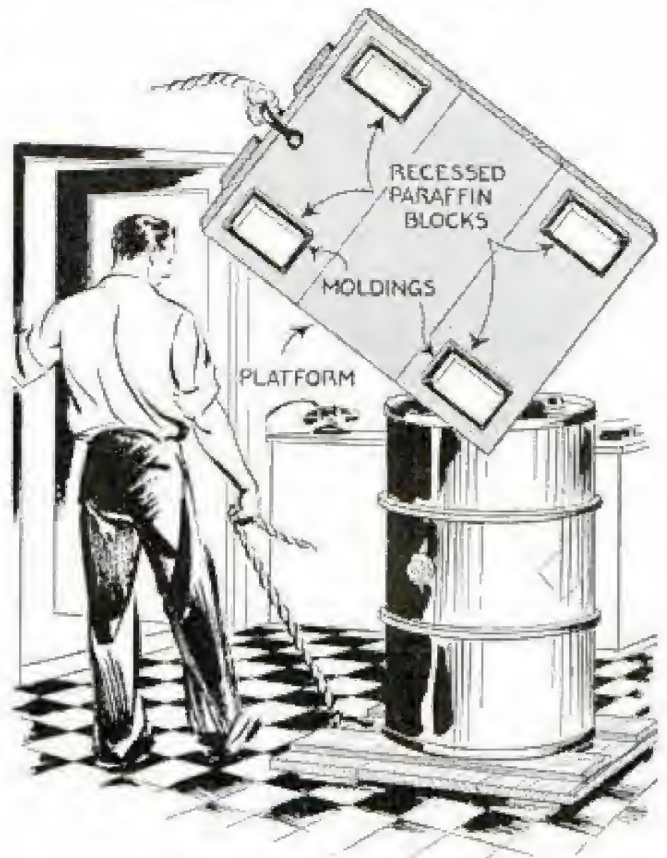


Chains in Dairy-Barn Doorway a Good Fly Chaser

Suspended from a hinged support over the doorway of a barn, discarded skid chains will serve to brush off flies as the animals enter. This will help to keep the flies out of the barn at milking time, and if the interior of the stable is kept darkened, there is little possibility of their entering before the work has been completed.



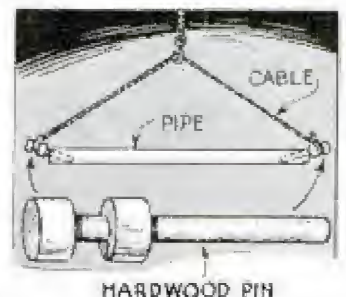
Barrels Skidded over Linoleum on Paraffin Blocks



Having a number of heavy barrels to move over the linoleum-covered floor of an office, this platform, fitted with cakes of paraffin for skids, was used to move them without marring the floor. Some of the paraffin was scraped off on the floor, but this was wiped up without difficulty after the job was finished.

Pipe Handled without Damaging Threads on the Ends

Instead of using iron hooks in the ends of large pipe when handling it with a hoist, use wood pins turned as indicated. The pins will not damage threads, which sometimes happens when hooks are used with the result that time and money are lost in repairing them. Or, maybe the pipe is assembled with the damaged threads and leaks result, so that part of the pipe has to be taken down and replaced.

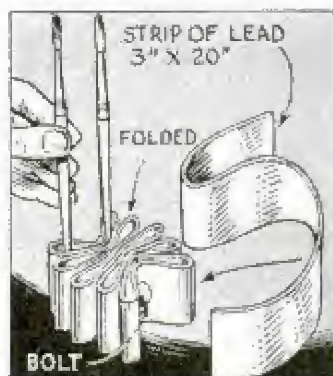


Pinfeathers Pulled from Poultry with Melted Paraffin



The tedious job of removing hair and pinfeathers from dressed ducks and geese was speeded up by one poultry raiser, who first dipped them in melted paraffin and then in cold water to harden the wax. When the paraffin was pulled off, it removed the hair and feathers. The same idea can be used by anyone who dresses a fowl only occasionally by simply melting a small amount of paraffin and applying it with a brush. The melted paraffin should be at a temperature just high enough to keep it from hardening, otherwise it may damage the flesh of the poultry.

Artist's Brushes Held Vertically in Doubled Lead Strip



By folding a 3-in. strip of lead as indicated, a sign painter made a holder for small brushes. A stove bolt through the center of the holder keeps it from spreading, and provides a double

row of receptacles. The metal does not scuff the handles of the brushes, and the

weight is sufficient to prevent them from being knocked over easily. Also, the soft lead permits any of the receptacles to be reshaped with the fingers as desired.

Chart to Record Pipe Fittings

The problem of neatly recording pipe fittings, especially reducing tees and elbows that have openings of different sizes, is solved with this chart. It is marked off in squares, one row of squares for each opening of the fitting, which is sketched on the margin of the squared portion of the chart. In recording, the number of pieces is written in the top row with the opening sizes written in the rows opposite that portion of the sketched fitting.

—W. F. Schaphorst, Newark, N. J.

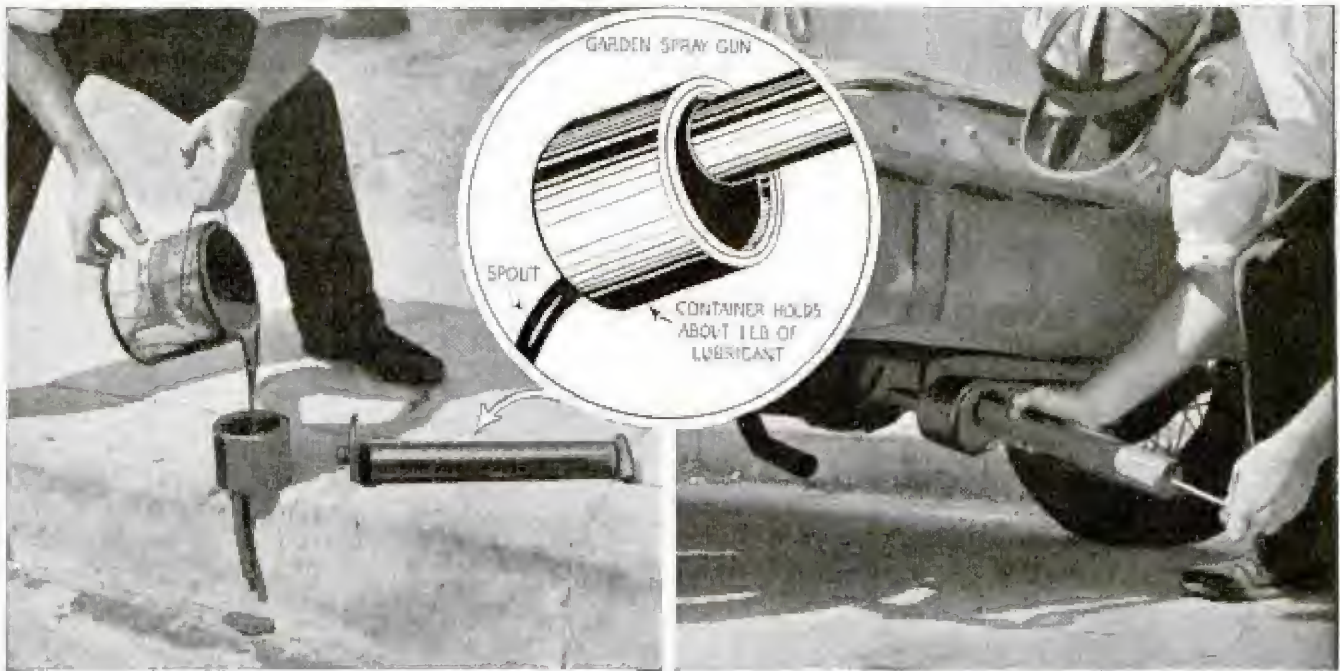
REDUCING TEES									
NO.									
T									
REDUCING ELBOWS									
NO.									
90°									
45°									

Barbed Wire Stapled to Beehives Keeps Livestock Away

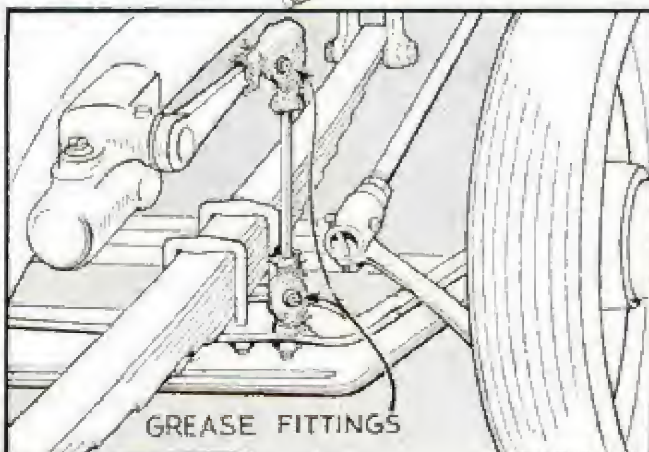
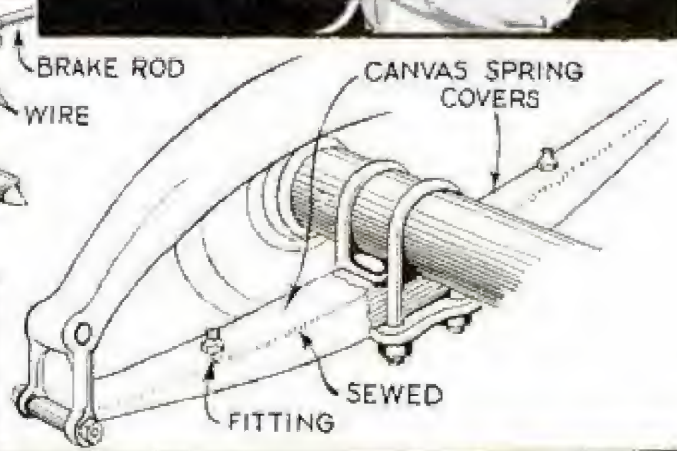
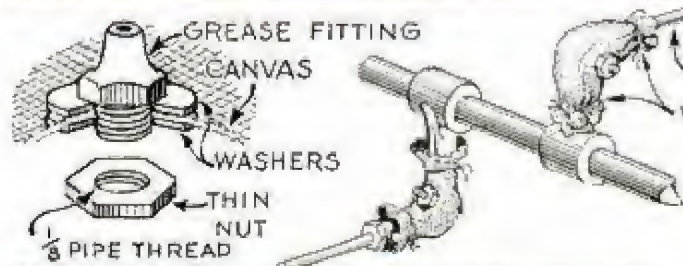
When livestock is turned into an orchard or lot to pasture where beehives are located, string barbed wire over the hives as shown. This will keep the animals from upsetting them during the night when the bees are inactive.



Money-Saving Kinks on Lubricating Your Car

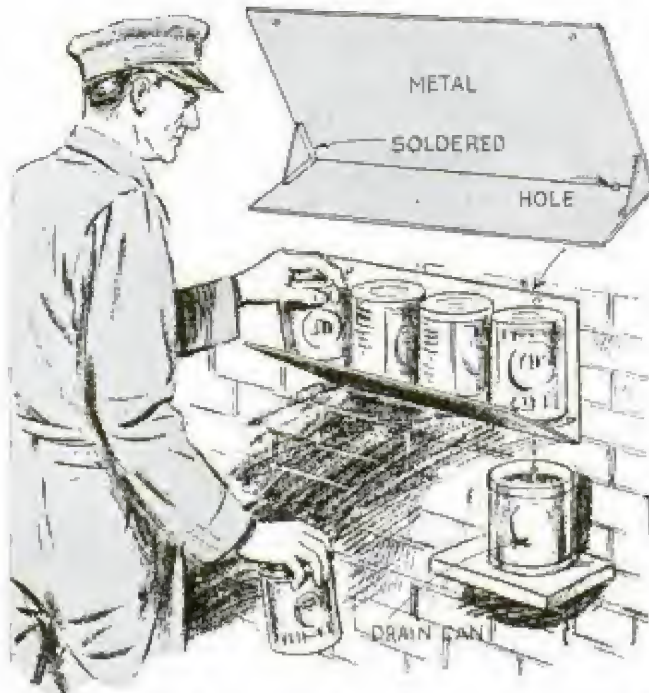


Motorists who grease their own cars and have no gun for filling the transmission and differential, can make one from a thirty-cent garden spray gun of the type used for dusting plants. Put the grease in the gun tank, insert the hose in the housing and operate the handle. Better lubrication can be accomplished on springs, brake linkages, steering-gear bearings and other exposed joints of some cars if they are covered with heavy canvas sleeves to help keep out dust. The sleeves are provided with grease fittings by putting washers on



each side of the cloth and driving thin nuts onto the fittings. Wire is twisted tightly around the sleeve ends to hold them in place. When using a grease gun, care must be taken not to burst the sleeves by excessive pressure.

Drainings from Empty Oil Cans Salvaged in Trough



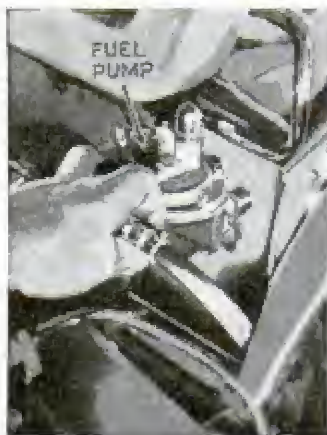
Oil that clings to the sides of empty oil cans is saved by one filling-station owner who turns the cans upside down in a sheet-metal trough and allows them to drain for a few hours. The trough should be kept inside a building away from dust. Or, it can be inclosed in a box.

Avoid Poor Battery Connections

When a battery is installed in a warm garage, always retighten the cable lugs after the temperature of the metal has been reduced to that outdoors. Unless this is done, contraction of the battery posts when exposed to the cold outdoors will make a poor electrical connection to the cables.

—V. A. Zimmerman, Decatur, Ill.

Priming a Dry Fuel Pump



Instead of using the starter to prime a dry fuel pump, which may run down the battery, try the following method: Remove or loosen the fuel line from the pump to the carburetor, and then remove the

screws that hold the pump. This will enable you to operate the diaphragm by hand much faster than is possible with the starter, and the battery will still be in shape to start the motor after the pump trouble has been corrected.

Battery-Cable Lugs Greased to Avoid Corrosion

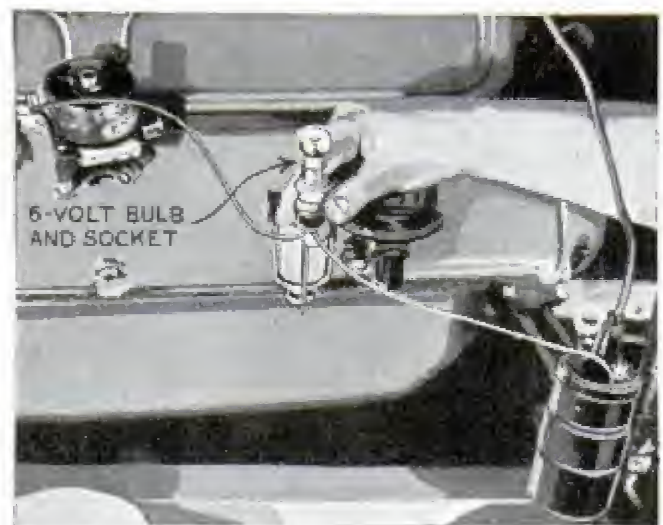
When installing a new battery, heat the battery-cable lugs and dip them in grease long enough to assure good coverage. This allows the grease film to penetrate the expanded pores of the metal better than when it is cold, and assures good protection against corrosion.



Generator Charging Controlled by Heater Rheostat

The small rheostat used to control heater motors provides a good manual control for the generator charging rate. The wire leading from the ammeter to the generator is cut and the ends connected to the rheostat. If the latter is the illuminated type, it provides a visible charging indicator.

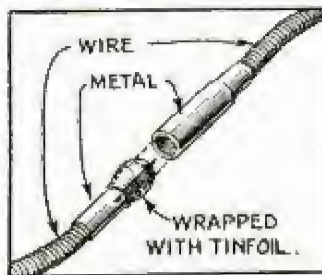
Visual Timing of Motor



The motorist who wants to time his own motor will find that a 6-volt bulb and socket will enable him to do it with a fair

degree of accuracy. Just wire the socket in series with the coil and distributor as indicated. The bulb will burn while the breaker points are together and go out when they separate. In this way, you can set the points so that they break just as the timing mark centers under the pointer.

Worn Headlamp Connectors Repaired with Tinfoil



When the sleeve connectors in the wires leading to the head and tail-lamps of my car became so worn that they fitted loosely and allowed the lights to flicker, I repaired them with tinfoil. This was wrapped around the male part of the connector so that it fit tightly in the female part to give good electrical contact.

—Leo. D. Levanas, Los Angeles, Calif.

Screwdriver Altered to Adjust Overhead Valves

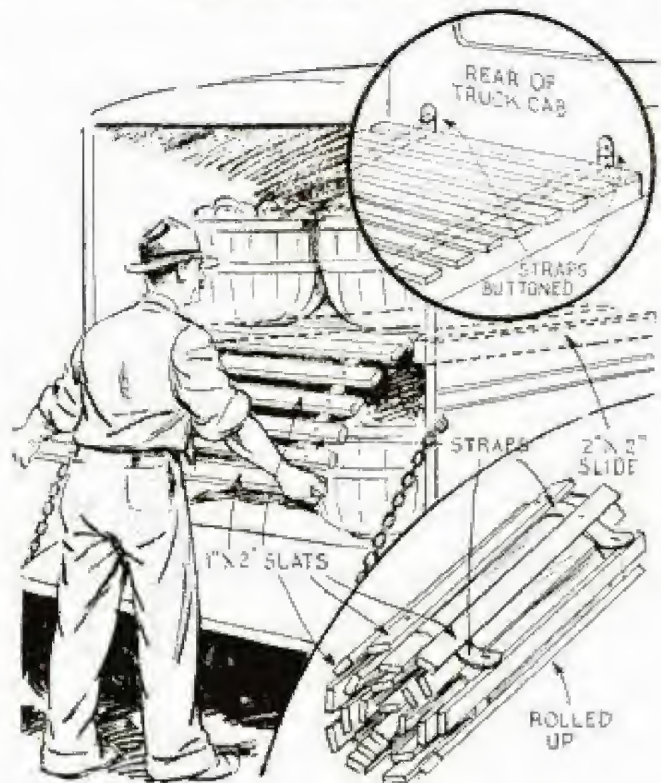


Holding a screwdriver in the slot of a push rod when adjusting overhead valves while the motor is running, is an easy matter if you use a screwdriver having the end of the blade altered as shown. Small projections at the sides of the blade prevent the screwdriver from slipping.

Safety Precaution for Child Riding in Back of Car

If small children ride in the rear seat alone, they may accidentally fall against the door handle and open it while the car is in motion. To avoid this, remove the handles and replace them in a vertical position. Thus only a direct pull in an awkward position for children, will open the door.—C. Pettrich, Bronx, New York, N. Y.

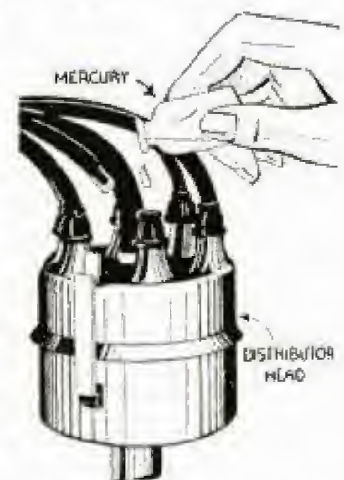
Roll Floor Makes Double Deck in Truck Body



To increase the capacity of his truck for hauling baskets of lettuce and other light vegetables, one driver uses a portable floor that can be rolled up in a bundle when not in use. It consists of oak slats fastened to heavy canvas strips. Slides are bolted to the sides of the body to support the floor.

Assuring Contact at Distributor and Spark-Plug Wires

Terminal ends of spark-plug wires often corrode where they enter the distributor, and set up a high resistance against the passage of current at this point. Or, the corrosion may reduce the diameter of the metal sleeves at the end of the wires so that poor contact is made with the distributor. To assure good contact, pull out the wires and apply a couple of drops of mercury in each "well" and then re-insert the wires.



—Minoru Kinnura, Clallam Bay, Wash.

Small Window in Grease-Pit Door to See Arrival of Customers



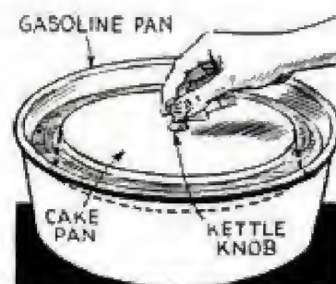
Attendants who operate small service stations alone will find a small window

near the bottom of a grease-pit door handy as it permits them to see customers who arrive while they are working in the pit. It also enables them to keep an eye on any merchandise that may be displayed outside.—V. Robinson, St. Paul, Minn.

Pie-Tin Cover on Washing Pan Prevents Evaporation of Gas

Gasoline kept in a pan for washing small parts in a garage can be prevented from evaporating rapidly by fitting the pan with a floating cover, which will also

serve as a tray for holding the parts as they are cleaned. Such a cover can be made by providing a pie tin with a kettle knob.



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The work can be done with ordinary hand tools. If the case is to be painted, you can use second-grade white pine

Simple Design—Sides are plain except the two rounded corners at the top, which give pleasing, simple lines without a boxlike effect.

Shelves Set into Sides—Shelves are fitted into grooves in the sides and the entire assembly is screwed together.

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3 Kodak 35 with Kodak Anastigmat Special *f*.3.5 lens and Kodamatic shutter (5 speeds to 1/200, delayed action), \$33.50—a new low price.

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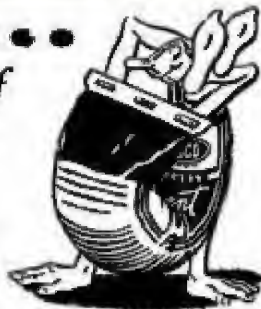
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2375

Dynamite—the Life Saver*(Continued from page 213)*

doomed tanker drifted aimlessly, and then sank in fifty feet of water.

The position of the 440-foot wreck made it a menace to navigation, so a crew of divers, skilled in blasting, set to work. One-third of the vessel was sheared off, raised and towed away. The rest of the hull was cut into pieces which were brought to the surface by a derrick barge.

More recently, the S.S. "Port Victoria" came to grief in the lower New York Bay. When it was realized that this large ocean liner could not be salvaged, a deep hole was blasted in the sand at the bottom of the bay. This hole was alongside the ship for its entire length. The great hulk slipped into the hole. Subsequent checking showed that the vessel was sinking deeper and deeper into the sand.

Only last summer, the excursion steamer "Mandalay" sank in New York Bay. No lives were lost, but the boat was beyond saving. Again, federal engineers resorted to blasting to rid the port of a navigation hazard.

Taming Ol' Man River to keep swirling flood waters from thousands of doors is a continuous job, with dynamite adding its bit where necessary. The explosive is used to straighten the courses of rivers, to remove obstructions that would dam them, and otherwise in flood-control projects. When the Mississippi goes on a rampage, dynamite crews rush to strategic points and stand by waiting the signal to blast levees and lower the water level for the protection of cities, towns and smaller communities.

Sudden thaws or heavy spring rains all too frequently cause the break-up of ice in many streams. Ice jams form at bridges, waters are dammed and streams overflow their banks. Property is damaged and life endangered. Dynamite is then used to release the impounded waters, either by destroying jams or by ripping channels through frozen streams to permit free flow.

The fire which followed the earthquake at San Francisco, in 1906, gave dynamite its opportunity to establish firmly a reputation as a fire fighter. To the accompaniment of the roar of blasts, flammable structures were leveled, and the spread of the great fire was retarded.

Forest fires and blazing oil wells and gas wells have given dynamite chances to combat fire. The explosive has been used time and again to extinguish fires in petroleum and natural-gas fields.

Taking down a condemned factory chimney is slow, costly and none too safe for those who do it. But by the skillful use of dynamite the tallest stack can be brought down in no time, at minimum cost and without risk of life or injury. Too, the chimney can be thrown down within inches of a line drawn from its base.

Landslides that threatened highway and railroad travel in different parts of the country have been stopped or prevented by resorting to blasting to form corrugations in the solid ground, deep down. These ridges anchor fugitive earth fills and prevent slipping. A hill-side mining town in Pennsylvania was saved from serious damage when the earth began to slide. Cracks appeared in sidewalk and street. The shifting of the ground was caused by water seeping over the underlying shale and slate, about twenty-five feet below the surface. This loosened the earth from its firm foundation.

Explosives engineers loaded holes with dynamite and blasted the shale and slate to roughen the surface enough to prevent the sliding of the earth. They then did further subsurface blasting to provide means for the water to run off through natural channels. And the slide was halted.

Dynamite has made highways safer through its use in the reduction of grades and the elimination or modification of curves. This applies especially to roads in hilly and mountainous sections.

Pure water, so essential to health, and water to control fires flows into the metropolitan area of New York through water tunnels more than one hundred miles in length, every foot of which has been blasted through solid rock.

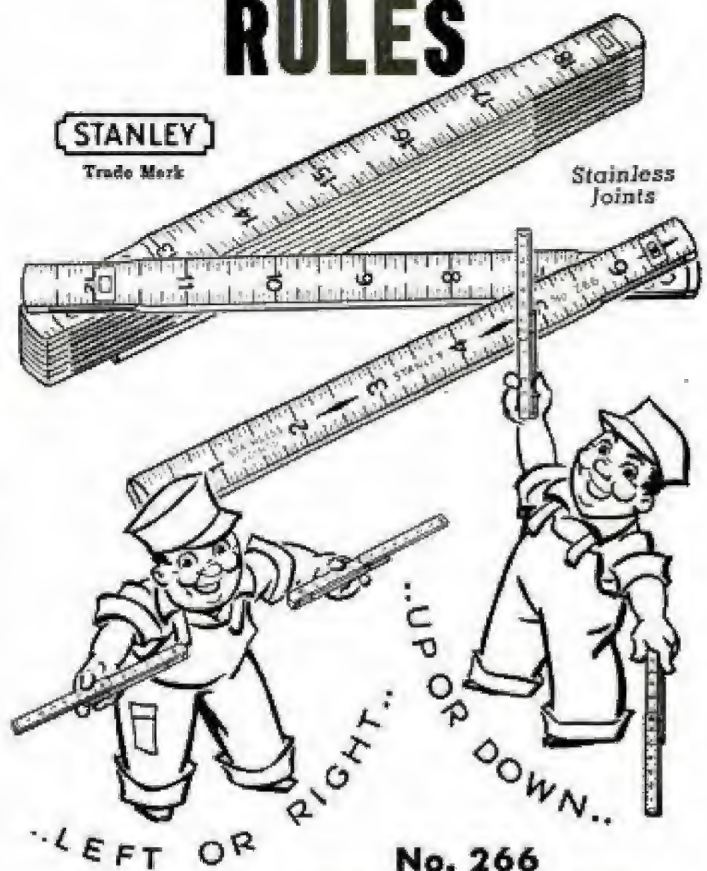
Thus dynamite, through contributing to safety, health, comfort and convenience, is an indirect, as well as a direct, saver of lives.

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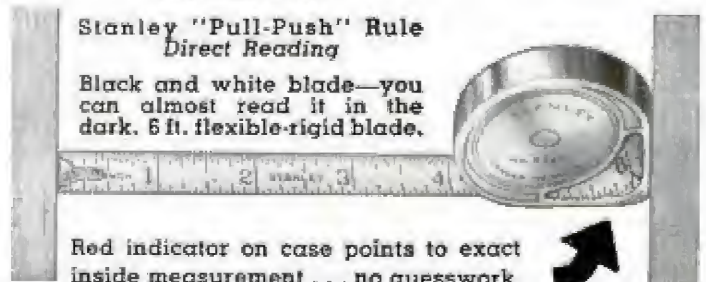
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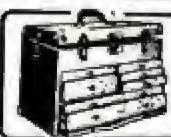


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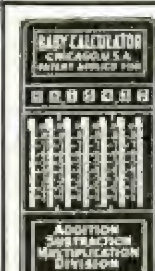


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Dos and Don'ts of Bicycling

(Continued from page 251)

far past the age at which athletes in other sports must retire.

Six-day racers ride in teams of two men, and one man must be on the track at all times. Of course, they don't maintain top speed for six days—that would be impossible—but they must compete with the other teams in sprints and jams while the spectators are there to cheer them on. The fastest pace is attained in the sprints, around forty-five miles per hour, and then comes the jam, which lasts longer at the lower average speed of about forty miles an hour. After the crowd has gone, the racers slow down, one riding for one to three hours, while the other sleeps.

In discussing racing speeds, Hill points out that wind resistance is about the only thing that holds down bike speed. Under some conditions, such as having the rider paced by a train or an automobile with a windshield constructed to protect the racing bike, speeds up to eighty miles per hour have been attained.

Today, six-day bike races are held in many cities of the United States as well as in other countries, and hundreds of thousands of spectators get their biggest thrills from the jams, as well as the antics, of the racers. But there's danger, too, on the six-day tracks, which are about one-tenth of a mile long, banked on the turns at a fifty-five degree angle. That's where Hill, who began riding professionally at eighteen, received the injury that caused his retirement. While attempting to pass between another rider and the fence at the top of the track, Hill struck the fence and landed on his back down on the flat, inside the track. That spill resulted in four broken vertebrae, and while Hill recovered, his doctor advised him against further racing.

Probably the greatest bicycle racing event in the world is held each year in Europe. It is the Tour of France, a 2,946-mile event. The 1938 event, won by Gino Bartali in a riding time of 148 hours twenty minutes, was witnessed by more than 1,000,000 fans.

The bicycle is probably the oldest fabricated article still being manufactured, in which the basic principles have been changed the least. The first one, back in 1818, had a saddle, two wheels and a handlebar. But it had no pedals and was called

a "walk-along" because, when seated astride, the rider pushed himself along with his feet faster than he could walk. The '80s brought the first safety bike, which had both wheels of the same diameter and a chain to transmit power from pedals to rear wheel. Just a little later came the pneumatic tire.

In the ten years prior to 1938, 5,250,000 bicycles were produced in America. Of these, nearly 2,500,000 were manufactured in 1936 and 1937, due to a sudden increase in popularity. Yet the United States is lagging far behind European countries in the use of bicycles. This country has thirty times the area of the British Isles and about two and one-half times the population, yet only two-thirds as many bicycles.

However, the bicycle is gaining ground steadily in this country and today between seven and eight million are in use. Bicycle trains, which carry riders and their bikes to desirable starting points for a day's outing, are popular. Hundreds of bicycle clubs, with thousands of members, have been organized. Cities and states are providing special bicycle paths in parks and along highways, with warning signs for the protection of riders. Educators and safety directors are advocating state licensing of bicycles.

Importance of knowing how to ride a bicycle in accordance with traffic regulations is already recognized in some schools which offer students a course in riding. Teachers organize clubs and give each member a skill test of riding fifty feet between two lines the width of the handlebars apart. The purpose of the clubs is to develop safe riding habits, to inculcate a sense of responsibility and to acquaint children with traffic laws. The bicycle rider of today, say the sponsors, will be the auto driver of tomorrow.

Rules of safe riding, as Hill lists them, call for riders to obey all traffic regulations, such as red and green lights, one-way streets, stop signs and hand signals; to ride in a straight line; to use white light on front and reflector danger signal on rear of bike for night riding; to have horn or bell for signaling your approach; to give pedestrians the right of way; to watch for cars at crossings and pulling out of parking places; to avoid hitching on vehicles, and to never carry another person on your bicycle.

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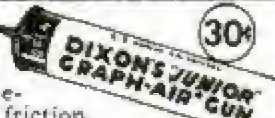
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16,000 Miles on \$4.20

(Continued from page 229)

ing the loaded canoe out into storms, practicing landing through high surf. We swam, hiked, and lived on rough food to prepare for the adventure trail ahead.

Then one October day we set sail from San Diego, Calif., in a haze of publicity, with \$4.20, well wishes from relatives and friends, and the none-too-gentle remarks of skeptics. We were rather skeptical ourselves, but would not admit it. What gave us courage to leave the harbor was the intensive training behind us.

However, our training hadn't prepared us for fish three times a day, and that was our diet along the barren coast of Lower California.

Another thing, the water holes marked on our charts proved non-existent. At the first dry water hole we had the choice of figuring out how to supply ourselves with water or dying of thirst. We combed the beach and collected an assortment of cans, a piece of copper tubing from a wreck, and miscellaneous flotsam of doubtful utility.

Our contraption, when finished, consisted of two rusted five-gallon cans, connected by the tubing. One served as a boiler for sea water; the tubing carried steam to the second can, which served as a condenser. We were elated to find that our crude "lifesaver" would produce almost a quart of fresh water an hour.

Sailing and paddling along just outside the breaker line during the day, shooting the surf to camp and forage on the beach at night, we made our way leisurely down the coast of Lower California, up the Gulf of California to Tiburon Island, and down the west coast of Mexico. Each day we learned something new, and faced new problems and adventures. At times we had to do some fast thinking. One day while camped on the beach at Sihuatanejo, we decided to explore the pinnacle islands, Islas Blancas, a short distance offshore.

Paddling along the seaward face of the largest of the group we saw a big sea cave. It seemed a good idea to paddle in, and curiosity egged us on, till we were in almost total darkness. Lighting our emergency torch—a rag wound around a small stick and dipped in oil—we continued on.

Soon the roof lowered almost to the water's surface. Apparently the cave contin-

ued beyond. Against our better judgment we scooted under the low spot between the swells coming in from the open sea, and found ourselves in a great cavern. The black, glistening walls reflected the light of our torch. The swells as they surged in made low, gurgling sounds.

A white, ghostly glow appeared ahead—it proved to be a smooth sand beach at the end of the cave. We landed with the thought—what an ideal place for buried treasure! After searching awhile among the boulders back of the beach, we returned to the canoe for more oil—but the canoe had drifted away! Ginger held the torch and I dove into the black water, swam out and retrieved it. As we dragged the canoe up onto the tiny beach, water surged up around our ankles and obliterated our tracks on the sand. With a start we realized that the tide was coming in—and there was that low spot between us and daylight.

Upon reaching the place our fears crystallized. The tide had risen to the roof, blocking our exit. Remaining in the cave till the next low tide was impossible—we'd be drowned like rats. We had to do something in a hurry. We could swim under water to safety, but that meant leaving the stanch little craft which had carried us through so many storms. We unzipped the cockpit, threw our weight on the gunwale and let the boat fill. As the canoe sank level with the surface of the water we grabbed the painter, took deep breaths, and swam under the barrier. Emerging on the other side, we dragged our water-filled canoe to safety, bailed out and paddled on to daylight.

Ginger and I had always wanted to go to Cocos. At Puntarenas, Costa Rica, we received permission to go to Cocos Island, which lies 350 miles off the coast.

The authorities would not listen to our idea of attempting the trip in the canoe, so they took us to this lonely paradise on the coast-guard boat, "Santa Rosa." Promising to return in eight months they sailed away, and we paddled toward the palm-fringed shore of Wafer Bay with only three weeks' supply of food and our limited equipment. Could we survive these eight months on a deserted tropic island? In Part II of our story, appearing next month, we'll tell of our Robinson Crusoe life on Cocos Island.

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There's No Place Like Home —for Accidents

(Continued from page 254)

well-known traitor. Pound for pound, it has more explosive power than dynamite—but you'd never keep dynamite around the kitchen. It's no one's fault but your own if you are silly enough to play with it as did one foolish fellow who wagered he could fill his mouth with gasoline and then insert a lighted match safely. The other fellow won the bet. But even the wary are tricked by gasoline. Knowing its explosive qualities, a woman took her garments to the open porch of her third-floor apartment for cleaning with gasoline. Down in the yard the janitor was burning papers, but that was three stories and eighty feet away. She didn't know gasoline vapor can travel downstairs. The fumes from her basin of gasoline flowed down the enclosed stairway like water down a drainpipe, drifted over to the bonfire and suddenly a whiff of flame raced up the stairs and the basin exploded, drenching the woman and setting the apartment ablaze. Another woman was rubbing clothes in gasoline and friction ignited it, burning her to death.

There are plenty of accidents you can't foresee, but there are plenty you can. Don't leave brooms or toys or worn-out carpets on stairs. Incidentally, Miss Rosamond Losh, chairman of the home safety committee of the National Safety Council, who as head of the Children's Bureau in Kansas City, Mo., has directed the outstanding home safety campaign in the country for fifteen years, blames wornout equipment for the rising curve of home accidents.

"The only way we can account for the increasing death rate," she says, "is the breakdown of physical equipment of the home due to the depression. Thousands are unable to make necessary repairs."

Fix up the broken step, the electric wire with frayed insulation; mend the worn rugs and tack them down. Put lights above the stairways, railings alongside stairs, bathtub and porch. See that all wires bear the safety label of the Underwriters' Laboratories, meaning adequate insulation and long life. See that it is impossible to electrocute yourself by touching an electrical fixture or metal switch while in the bathtub or contacting the washing machine or fau-

Q 315
cet. Insulation of your washing-machine may wear out some day and put you in danger of a shock by touching the washer. You can prevent it by grounding the machine with a wire connecting its metal frame with a water pipe. Then, if electricity leaks, a fuse would blow before harm is done.

A home safety questionnaire is an easy way to check over the hazards of your house. That is a principal feature of Miss Losh's 365-day campaign in Kansas City. A force of 3,000 volunteers makes a house-to-house canvass, offering to inspect homes for hidden dangers. Children are given self-inspection blanks in the schools to be taken home. A tour of the house with this questionnaire eliminates many a hazard. Here are some tips you can take from it:

Don't use a gas heater in a closed bathroom. Keep oily rags and mops in a fire-proof container. Never handle electrical fixtures with wet hands. Put bells on bottles of poison, or stick pins in the cork—and keep them out of the reach of children. Don't put pins in your mouth. Extension lights used in garage work must be wire-protected; if a hot bulb shatters, gasoline vapor might be ignited. Get rid of sharp toys and see that electric playthings are insulated properly. Sharp tools and kitchen knives should be inaccessible to children. Don't throw broken glass in a wastebasket. Protect your outdoor radio antenna with a lightning arrester. Mop up spilled grease now, not later. Use only safety matches, and strike them away from you. Open the oven door for ventilation before lighting it. Clean up the rubbish pile in the basement and attic. Screen the fireplace. Get a fire extinguisher. Don't clutter the stairs with mops and galoshes and loose things. Lighting fires with kerosene is dangerous. Paper lampshades can catch fire from hot bulbs. Pot handles should be turned away from the stove edges. Don't pull out electric plugs by the cord—pull the plug itself. Don't put wires under the rug, or near a radiator. Keep a first-aid kit where you can find it.

Home ought to be a haven of safety. You can make it reasonably safe by enacting a few laws of your own and enforcing them. Inspect the house occasionally to see that the dangers you can foresee are abolished. By vigilance you will improve your chances of staying off the casualty list.

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"QRR—Prepare for the Worst!"

(Continued from page 223)

needed. Well aware of the value of co-ordinated activity, they cooperated in manning one station, W1EBO, high on its hilltop location on the edge of the city. A five-meter link, using army equipment, to the city hall provided a direct circuit for city and relief officials, thus helping to speed up rescue and the transport of supplies to the stricken area. All of Norwich's communication, official and otherwise, went through this station for four days following the storm.

Today's trend toward a highly specialized type of amateur emergency preparation is the logical outcome of a long history of participation in disaster relief. Nearly twenty years ago the entire Twin City region of Minneapolis was isolated by a blizzard that brought down all wires. Someone thought of the local amateur station at the University of Minnesota—perhaps it could furnish the vital link to the "outside." It could and did, and for two days handled press and official emergency traffic. In nearly two decades that have passed since, not once has amateur radio failed to respond when called on to provide communication from stricken centers.

It has become apparent in recent years, however, that this service depended too frequently on fortunate combinations of circumstances that put a completely self-powered amateur station in a region where all power lines came down, or assured signals from weak stations in isolated centers being picked up promptly by brother stations outside. Precious time was being wasted in clearing the air of non-participating stations, and in building up networks to handle the traffic. In the emergency regions there was lack of coordination among the existing amateur facilities.

Study of this problem resulted in the emergency corps plan which is being promoted among the thousands of amateur members of the A. R. R. L. throughout the United States and Canada. Under the plan the "emergency coordinator" is the hub of amateur preparedness organization in his community. His job is to organize all amateur facilities, pick the best stations in each group to act as key stations, select the fastest and most accurate operators to man key and microphone and plan the utilization of the remainder of available person-

2427
nel for an operator reserve, a staff of message clerks, technicians, etc. In this way, instead of a large number of local stations being on the air, the best-located and best-equipped stations for the work in hand are to be manned by the most competent operators. The coordinator also contacts local Red Cross, police, press, military and civic authorities during normal times, to inform them of the availability of amateur communication, to acquaint himself with the requirements of each service and plan how best to meet those requirements with amateur facilities at his disposal.

Communication needs in time of emergency, League officials found, boiled down to three types: first, intra-city or "cross-town" work to replace or augment local telephone service between relief agencies in the community; second, communication between the towns in the stricken area and those immediately outside; third, long-distance communication. All these are provided for in the emergency corps plans.

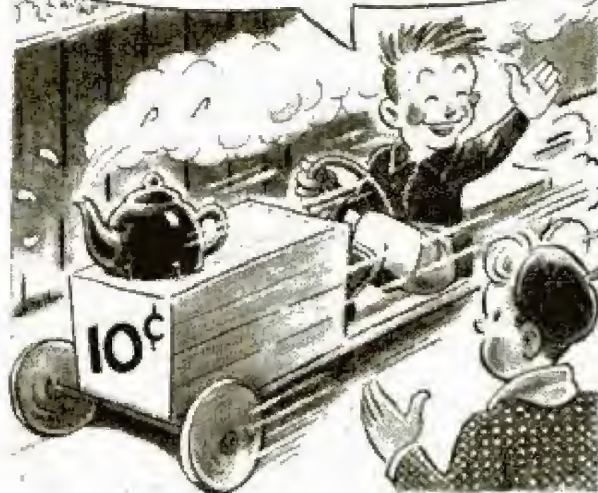
The five-meter band, in general, provides communication only for visual distances and so is ideally suited for the handling of "cross-town" traffic. Medium distances are spanned on the eighty-meter and 160-meter bands and these thus become ideally suited for inter-city work, the handling of dispatches to relief agencies near by, reports of river heights, press and personal inquiries, etc. If long-distance communication becomes necessary, the forty and twenty meter bands may be used.

The A. R. R. L. for several years has been promoting the construction by amateurs of auxiliary emergency equipment designed to work independently of commercial power lines. Most of this equipment is designed to operate from ordinary six-volt storage batteries, although some of the larger amateur club groups pool their resources and purchase gasoline-driven generators.

As a proving ground for these portable-emergency stations, the League sponsors an annual "Field Day" in which amateurs pick the most isolated spots they can find, set up equipment and establish communication with other amateur stations.

More than 2,000 operators have registered themselves and their apparatus at League headquarters in West Hartford, and more than 200 coordinators have been appointed. Thus the radio amateur is preparing to combat the disaster of tomorrow.

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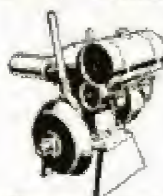


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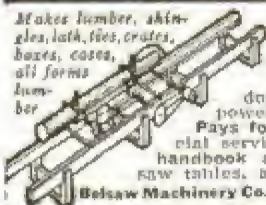
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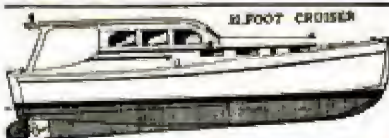
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Ships for the New Merchant Fleet

(Continued from page 245)

492 feet long, have a draft of twenty-eight feet, and a speed of sixteen and one-half knots. They will have accommodations for sixty-eight to 100 passengers and are to cost about \$3,000,000 each. Each ship has five cargo holds with a deep tank at each end of the vessel for oil cargo or ballast. Propulsion will be by a single screw driven by a geared turbine of the latest design with steam supplied by oil-burning water-tube boilers.

This spring the first of a new fleet of fast tankers intended for commercial service but capable of traveling with the battle fleet as auxiliaries was launched. In all twenty-four of these ships are under construction or planned. The tankers will have sustained sea speed, fully loaded, of sixteen and one-half knots and will be required to develop eighteen knots in trials. Each will be 525 feet long and will have a cargo capacity of about 150,000 barrels. Engines will develop 12,800 horsepower, about three times the power of most tankers now in service. Ships using steam power will be fitted with the latest turbo-electric drives, using superheated steam at 900 degrees Fahrenheit and up to 625 pounds pressure per square inch. The vessels will cost some \$3,000,000 each.

Features that make them useful as naval auxiliaries include their two-compartment floodability and stability, magazine spaces and gun foundations, gear for refueling other vessels at sea, extended cruising radius, and twin-screw propulsion. They are to be equipped with paravane gear for protection against mines and with Navy searchlights.

The first twelve tankers of the fleet are being built by the Newport News, Sun, Bethlehem, and Federal ship-building companies for the Standard Oil company of New Jersey at a total contract price of \$37,500,000.

There are currently being launched a number of other new tankers, not included in the Commission's program, that mark new high levels in seagoing comfort for the crew. Of slightly less capacity and speed than the others, they are fitted with all the latest improvements including automatic radio SOS receivers and automatic alarms to indicate failure of the running lights or failure of engine oil feeds.

Money Savers for the Builder

(Continued from page 199)

two quarter-inch plywood sheets glued to an internal framework, forming a finished wall two inches thick. The internal air spaces may be filled with insulation. The panels are locked together permanently at the time of erection with no visible construction joints. This system is somewhat cheaper than ordinary types of construction and is said to be much stronger than the usual frame construction, as well as much lighter.

In another effort to bring down costs, one concern has developed a method of pouring reinforced concrete homes at prices that compare favorably with frame and stucco construction. After the floor is poured and steel exterior and interior wall forms are erected, all standing walls are poured in a continuous operation that requires only three-and-a-half hours for a five-room one-story house. Exterior walls are really double, consisting of two inches of concrete, a six-inch air space with concrete studs, and two more inches of concrete. The building is reinforced with steel rods embedded in the structure and is rot-proof as well as termite, fire, and earthquake proof. Both this concrete construction and the plywood construction may be adapted to different plans.

One approach to prefabrication that is being tried at present is to pre-cut all the framing of a house. As a matter of fact partial prefabrication of the home has already arrived. Standard sizes of windows, stock entrance doors and frames, and such things as factory-made cabinets and mantels are widely available. As much as twenty per cent in the cost of such items can be saved by using stock patterns and sizes, yet they may be arranged to fit any architectural plan.

The number of new homes built per year in the United States has been increasing. Last year some 325,000 family units were built and estimates have been made that the total this year will be one-third larger, the largest number of family units in any year since 1924.

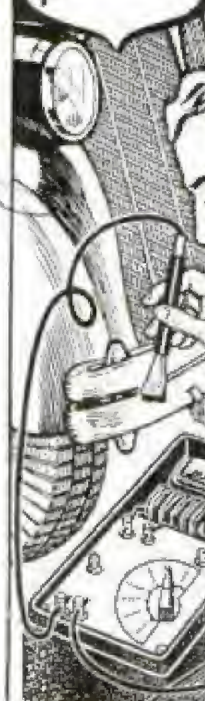
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The High Seas Flying Patrol

(Continued from page 235)

dicators read 110 knots but when the navi-
gators make their 10:00 p.m. position
checks they can see that the fleet is mak-
ing good a ground speed of 150 knots, due
to the strong tail wind. At this rate the
steadily droning armada should pass over
the third station ship on the surface in an-
other quarter of an hour. The wing com-
mander calls the destroyer by radio and
requests that it turn on its searchlights.

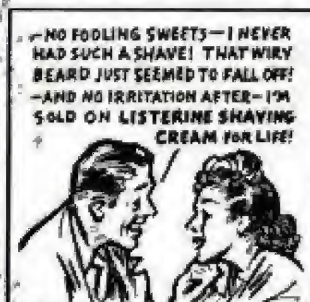
Five minutes later comes a radio mes-
sage from one of the planes. "Compat
wing one from compatron nine. Search-
light beams sighted bearing 355 degrees
relative. Distance about fifteen miles." A
few minutes later the formation passes
over the ship. The wing commander re-
ports his progress back by radio to the
commander of the aircraft scouting force
in San Diego harbor and sends a message
ahead to Pearl Harbor, notifying the fleet
air base of his expected arrival time.

By midnight the full moon is so bright
that the breaking waves far below the fly-
ing boats are visible. Course is changed
three degrees to the left to remain on the
great circle course and to make the land-
fall, and at 1:30 the fleet sights the heavy
cloudbank that normally hangs over the
northeast coast of Oahu Island.

Another radio order from the com-
mander drops the fleet down to 1,500 feet
and the planes begin the swing around
Makapuu Point. Over Pearl Harbor the
leading plane drops down to within fifty
feet of the water and the pilot starts a
power stall, mushing downward until he
can hear the swish of water around the
flying boat's keel. By the time he has
straightened around and is taxiing toward
the ramp the second plane is down and
the third is circling for its landing, a little
more than seventeen hours out from San
Diego.

In the last two years fifty-nine of the big
PBY flying boats, carrying 413 men, have
flown from the continent to the Hawaiian
Islands. Flights of a dozen or more planes
from San Diego to the Canal Zone are
made. The high seas flying fleet is rolling
up an impressive record of missions ac-
complished in a routine manner, on sched-
ule, without incident.

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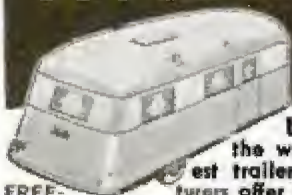
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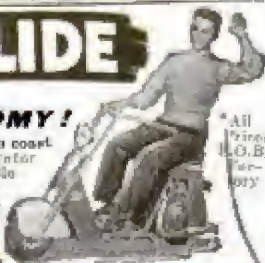
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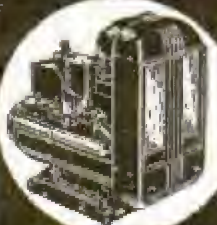
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The Trailer Grows Up

(Continued from Colorado Section)

constructed to keep out heat in summer, cold in winter and dirt and dust in all seasons. With modern fuel-oil heater stoves, it is possible to keep comfortable inside a trailer even in sub-zero weather.

Although manufacturers are using insulation plentifully, the trailer purchaser should be careful that the floor be adequately protected with a heavy layer of insulating material beneath. This prevents the cold air flowing beneath the trailer from making the interior uncomfortable in cold weather and saves the space heater from overwork. A well-insulated trailer is easy to heat, and to keep heated.

Some owners frown on the use of carpets and rugs in the trailer, pointing out that they get full of dirt, dust and germs. Linoleum is recommended, principally because it is easy to keep clean, although it is cold on frosty mornings. Water and soap are used on linoleum, with wax being applied afterward.

Manufacturers urge owners to try to equalize the load in packing the trailer. Too much load aft will cause the trailer to "fish-tail," which is annoying and sometimes hazardous, particularly at high speeds. A preponderant weight on the right side will tend to run the trailer down off the crown of the road. Where the highway is bordered by soft dirt shoulders, this is dangerous. Still another recommendation is that the owner have his auto headlights readjusted with the trailer attached. Otherwise, with the rear of the car depressed by the additional weight, the beams will be set at too high an angle for safe driving. An external rear-view mirror, mounted on the car door or fender, is essential for the car-and-trailer unit.

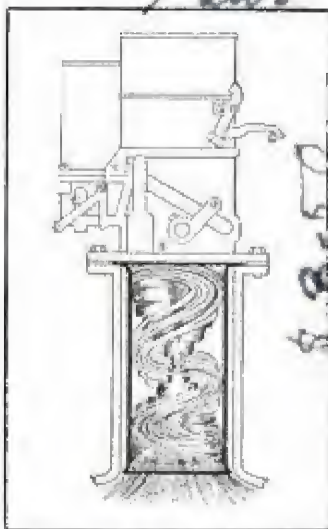
While the modern trailer is virtually accidentproof, so far as disastrous results from blowouts are concerned, tiremakers and inventors are going a step farther toward safety. For instance, punctureproof tubes for trailer tires are available. Too, it is possible to mount a steel rim beside the trailer tire so that if a tire blows out, the trailer will travel on the rim and prevent damage to the tire. Lately, another safety device has been introduced. It consists of two prongs extending down beside each trailer tire. If a tire goes flat, the prongs

are spread apart, causing an alarm bell to ring in the tow car.

About ten years ago, Arthur G. Sherman of Detroit set out with his family on a camping and fishing trip. Behind his car he pulled a tent on a box trailer. He had been told that the tent could be put up in fifteen minutes, with no trouble. Parked beside a lake in northern Michigan, in a driving rainstorm, the Sherman family tried to erect the tent. Fifteen minutes became thirty, then forty-five—and still the tent wasn't up. Exasperated by this experience, Sherman returned home and built a trailer complete with a top that would require no setting up. Thus was born the trailer-building industry in America.

With the rapid advancement of the trailer in the last ten years has come an almost equal improvement in facilities for the trailerite on the road. Today there are approximately 20,000 trailer parks in the United States. Most of them offer ample space for parking, connections for water, gas and electricity, sanitary facilities, service station for the auto and trailer, a store where supplies may be replenished and perhaps a community center for dancing and other forms of recreation. Any owner contemplating a trip anywhere in the United States may obtain a list of parks approved by the manufacturer of his trailer.

Fuel-Saving Mixer for Auto Breaks Up Gas for Motor



Designed to spin the fuel mixture and thus convert it into a finer vapor than is possible with ordinary equipment, a gas-mixer for automobiles has been placed on the market. Its makers claim that it will increase gasoline mileage, give the engine more

pep, reduce cylinder wash and make the engine start easier in cold weather.

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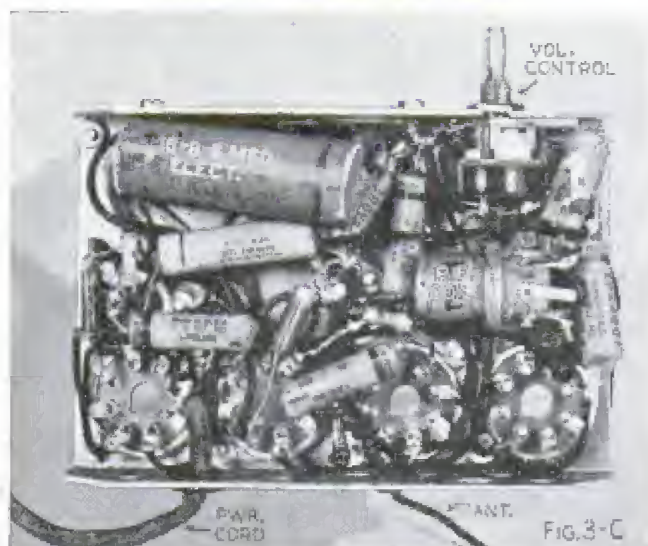
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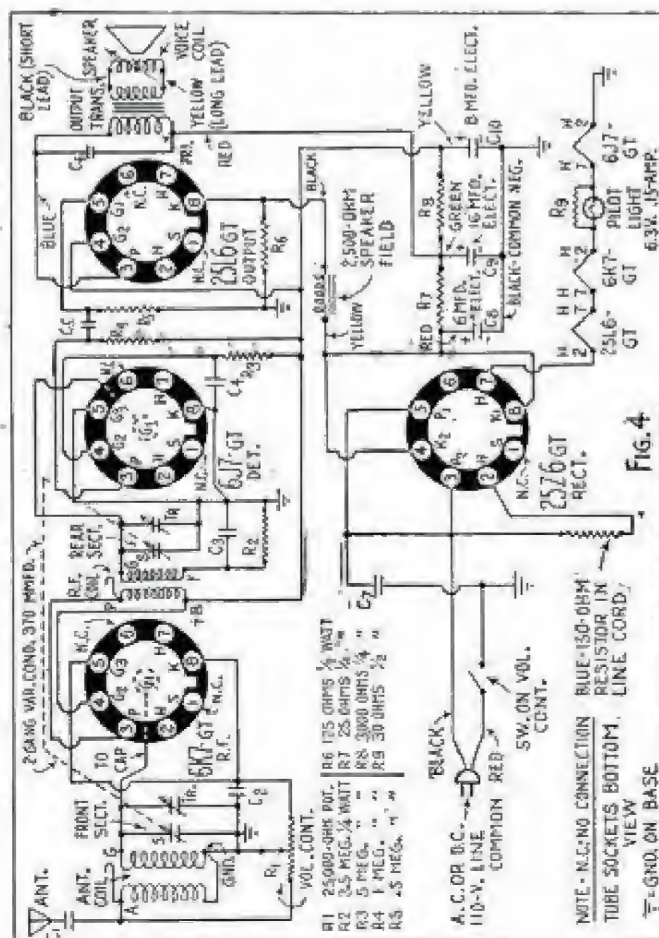
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Tiny Set Uses Bantam Tubes

(Continued from page 297)

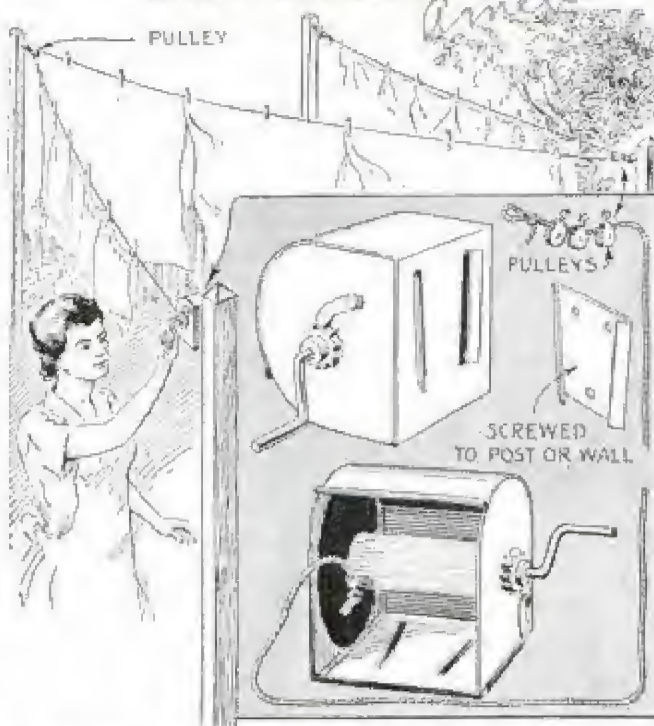


To balance the receiver, stretch out the flexible antenna to the length you wish to use it, and then tune in a local station near 1,400 kc. Now reduce the volume to a low point and adjust the front and rear trimmers (TR) with a small screwdriver until greatest volume is obtained at that dial



setting; the set then should be in balance. A detailed list of the original materials can be obtained from Popular Mechanics radio department without charge. The blueprint number of this article is R-269.

Reel Holds Clothesline Taut and Prevents Snarls



Small reel for clothesline solves problem of keeping the line at proper tension

Fitting into a standard bracket on the basement wall or outside the house, a clothesline reel keeps the line tight at a turn of its ratchet-type crank. It is hooded for protection from sun and rain.

Baby Tractor Five Feet Long Runs One Mile an Hour

Top speed for the baby tractor built by a Maine radio man is a mile an hour in high gear. He built it "for entertainment" as well as for cultivating a garden. Only five feet long and three feet high, the tractor is driven by a two-cycle, three-fourths horse-power motor of washing-machine type, with three-speed motorcycle transmission.



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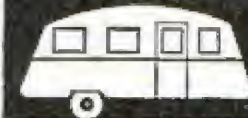


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What You Would Find on Mars

(Continued from page 219)

would be the hardship of preparing a meal. To begin with, we could not cook by fire because there is not enough oxygen in the air of Mars to light a match. All the cooking would have to be done by electricity. Furthermore, although a little heat would soon set the water to boiling vigorously, it would only be lukewarm. For the temperature at which water boils decreases as the pressure of the air gets less. While we cannot say exactly what the air pressure is on Mars, it must be much lower than it is here, perhaps only twenty per cent as much. In this case, water would boil on Mars at a temperature of 140 degrees instead of 212 degrees, and a pressure cooker would be necessary to make it any hotter.

The low atmospheric pressure might cause us severe distress, such as deafness and mountain sickness. Indeed, if the pressure were too low, we would have to go around incased in an air-tight suit inflated to atmospheric pressure in order to survive. Otherwise we would explode, like a deep-sea fish that has suddenly been brought to the surface.

Water is exceedingly scarce on Mars, and to be on the safe side we should bring along an abundant supply. There are no oceans, seas, or rivers, over sixty per cent of the planet being a barren desert. Practically the sole remaining source of water is the white deposit at the poles believed to be a layer of snow and ice a few inches thick. The polar cap shrinks with the approach of summer and a dark border forms around it that stays in contact with the cap, presumably due to water from the melting snow. Probably all the water on Mars could be emptied into the Great Lakes.

At noon in the tropics the temperature may rise as high as fifty degrees Fahrenheit. But a few hours after sunset it falls to freezing, and by midnight it must be much colder than the lowest temperatures ever experienced on the earth. It might easily become cold enough to freeze carbon dioxide, causing dry ice to form on the ground like frost. Large white deposits are often seen on the early morning side of Mars, that disappear later in the day as the ground is heated by the sun's rays.

On the whole, we would find Mars a cold and dreary world, not at all suitable for beings like ourselves.



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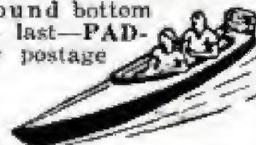


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The Electric Home of the Future

(Continued from page 185)

row no doubt also will be equipped with some electrical means of recording news reports and pictures as soon as the news happens.

These are all important phases of the significance of electricity to you. To more than half a million men and women electricity also means jobs. Some 274,000 persons were employed during 1938 in keeping electric power moving into more than 20,000,000 homes and hundreds of thousands of factories, offices and stores. In addition, the electrical manufacturing industry employed more than 300,000 persons in supplying equipment for the nation's power systems.

As industries go, the electric power industry is young, but it is a lusty youngster, for even in the slump year of 1938 it did more than two billion dollars' worth of business. Some 600,000 new customers were added to its rolls of electricity users. In contrast, thirty-five years ago the annual electrical business of this industry amounted to only \$100,000,000.

In 1928 the average residential power user consumed 460 kilowatt-hours of current a year and paid an average of six and six-tenths cents per kilowatt-hour. In 1938 he used 850 kilowatt-hours and paid only four and two-tenths cents per kilowatt-hour. This saving has been made possible by increased efficiency in the production and distribution of electric power.

In 1927, \$148,400,000 worth of kitchen and table appliances, such as electric ranges, water heaters, vacuum cleaners and washing machines, were sold. Ten years later this figure had jumped twenty-five per cent to \$175,000,000. During the same period sales of electric refrigerators more than tripled.

Against the reality of such figures and achievements, one dares not place any limits on the possibilities of electricity in the future.

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Catch 'Em on the Fly

(Continued from page 171)

aim your line toward the surface of the water; cast it straight ahead on a level with your shoulders. Rhythmic counting of the movements helps. Pick your line off the water for the back cast at the count of "one"; allow it to go backwards for the counts "two" and "three," waiting for "four" before making the forward cast.

It's not the fellow who casts farthest who catches the most fish; short, accurate casts and lots of them are what bring home the prizes. Nor is a trunkful of tackle needed. With only four baits, we've caught everything—muskies, bass, pike, trout, steelhead and most medium-size saltwater fish.

Of the hundreds of lures on the market, each does one of two things, a spin or a wiggle. Many times a fish will take a spinning bait where he won't go near a wiggler, and vice versa. Consequently, we have two spinners and two wigglers. One of each type is a deep-going lure, the others are for near-surface or weedy shoreline fishing. All four have single hooks and weed guards and can be cast anywhere by novice or expert with virtually no snagging.

The spinner also is effective for night fishing or in murky waters. You don't need big bait to catch big fish. The opposite is closer to the truth. Experts lean toward metal lures that are made small, yet heavy enough to cast easily.

You can waste a lot of valuable time casting from deep water to shore line or shore line to deep water. We prefer the weeds or parallel to the shore line where the bait is in fishable water from the instant it strikes. Another favorite haunt is near the boat landing. Many fishermen will jump in a boat and head for the other side of the lake or stream. We prefer to fish a few hundred feet to either side of the boat landing and usually are fortunate in getting a mess of "the granddaddies who stick close to shore where they are seldom bothered." The fisherman who doesn't try the shore line and the marshy stretches amid the weeds and lily pads is passing up excellent opportunities.

When you get a strike, set the hook hard and then, to be certain, set it again. This will insure the barb penetrating the fish's mouth. Many fishermen set a hook halfheartedly and the first time the fish jumps

or starts fighting hard, he throws the lure.

A rod is made for casting and not for lifting fish out of the water. When pulling in bass or other fish without teeth, you can stick your thumb in its mouth and lift it out of the water. With a pike or a muskallonge, a landing net or a gaff is your best bet. No matter what you use, be sure it's not the rod. Once you work the hooked fish within a few feet of the boat, stick your rod into the water within a foot of the reel and slowly drag the fish through the water in a figure-eight motion until he tires and turns on his side. He can then be picked up with the hand or released as desired.

A word about equipment. The average person going into the sport decides he'll try bait casting first. He buys a reel, line, and lures and makes for the nearest water. His first attempt produces a backlash that looks like a bird's nest. After an hour of disentangling the line a second cast is made; this time the bait shoots out twenty feet or so. He snags a tree, breaking his line to get it free. A half dozen more snarls and he's ready to call it a season.

The fault does not lie with him so much as with mismatched equipment. His rod may be short or stiff, his line heavy, his reel equipped with a heavy metal spool, which over-runs and causes a backlash. A rod should be neither too stiff nor too limber. A short, stiff rod casts farther and sets the hook better but is less accurate. A long rod offers greater accuracy, more thrill, but does not set the hook in the fish's mouth easily and is a handicap in brushy places. For best all-around results, we favor a five-foot bamboo pole with lots of tip spring or a 5.2 tubular steel rod.

A beginner usually selects a line strong enough to tow a boat. It is suitable for trolling or deep-sea fishing but not casting. A smooth and easy small-diameter fourteen-pound test silk line is better.

Sixty-five per cent of the tackle is in the reel. Unless it's a fast aluminum spool reel, it's just a lawn mower. A reel deserves care. On each side is a small jewel bearing; a drop of machine oil in both of them regularly will keep the spool in perfect running order. The reel should be cleaned three or four times a season. When it's being reassembled, see that the spool is adjusted with a small amount of play. The bearings will be burned if it's too tight; too much play will wear them out.

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How to Get More Mileage

(Continued from page 191)

pression ratios of modern engines must be maintained if maximum miles per gallon are gained with increased compression. Increased compression pressures also produce higher speeds with less throttle opening. It means the engine runs cooler because more of the heat is turned to useful power and not wasted in the exhaust or cooling systems. But all the benefits of higher compression are lost if the valves do not seat tightly, usually due to gum formations on the valve stems, or if the piston rings are excessively worn. A compression test of each cylinder should be made with a compression gauge if there is any doubt about the physical condition of these parts.

Getting more gasoline mileage and better performance may be achieved if the car owner will check the exhaust system for restrictions. Sometimes a tail pipe is partially clogged by foreign matter, or it may be kinked. Mufflers, too, wear and rust out which often results in some of the interior parts becoming loose or dislodged in such a way that there is excessive back pressure.

Carburetors, especially those on the late model cars, can be adjusted or made to meet the requirements for all speeds and conditions. Assuming that the carburetor is up to standard, which means that the fuel level is correct, that the high-speed system is working properly, the accelerating pump works and that the choke mechanism is in order, then both power and economy are possible.

Instruments are available which test the exhaust gases while the engine is running, from which much can be told quickly. If the carburetor is up to standard in every respect and correctly adjusted it automatically delivers to the engine the correct mixture of air and fuel for idling, low-speed and high-speed operation. Exhaust gas analyzers quickly show this. It has been found that a determination of the amount of carbon dioxide in the exhaust gas serves for the establishment of carburetion mixtures.

Too rich a mixture means sluggish performance, slow combustion, excessive carbon formation, as well as poor mileage. Too lean a mixture causes slow burning, lack of power, misfiring and there is dan-

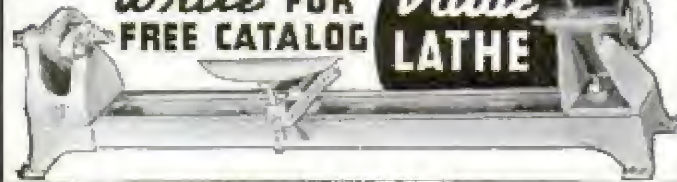
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229.9
ger of burning the engine valves. Somewhere in between this too rich and too lean condition is a point of normal operation.

Although various things in the ignition system like the battery, cables, coil, breaker points, distributor, spark plugs and others affect miles per gallon, probably one of the most important is the timing of the spark in the cylinders. A properly advanced spark greatly improves fuel mileage, especially if good quality gasoline is used which permits the greatest spark advance before knocking occurs. In fact, this is why premium fuels treated with tetraethyl lead give much better mileage. Too great a spark advance, on the other hand, wastes power and gasoline mileage will suffer. Ordinarily there is a steady rise in miles per gallon with an advance of the spark.

And finally, the way a car is driven tells much about its fuel mileage. When two cars of the same make and model and in the same mechanical condition show a pronounced variation in miles per gallon, there can be but one answer—the difference in car speed and conditions of driving.

High-speed driving takes its toll of gasoline. Not many car owners realize how rapidly the curve of gasoline mileage drops off when they drive with a "lead-foot."

The normal economy of a motor car which gives twenty miles to the gallon at twenty miles per hour varies under different car speeds with a fixed throttle opening until only eight and one-tenth miles per gallon are obtained at seventy miles per hour.

Long periods of acceleration, excessive or too fast idling and racing the engine when standing still all impair fuel economy. With present-day types of carburetors every time you "step on the gas" the accelerating pump is actuated in the carburetor and a steady stream of raw gasoline is shot into the engine.

Keep the tire pressure up to the proper point if you want the best in gasoline mileage. Mileage is rapidly reduced when the tire pressure is reduced. At thirty miles an hour, for example, there is a difference of two miles per gallon of gasoline with tires at fifteen pounds as against thirty-five pounds. Soft tires also make the car sluggish during acceleration and more throttle opening is required, materially affecting fuel economy.

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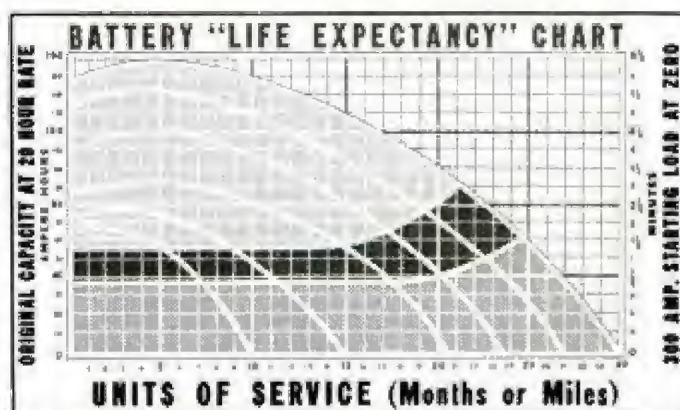


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